

百海

念四

七川

號 路

FAR EASTERN REVIEW 3

Engineering

Finance

Commerce

RARY。 東 東

報

Vol. IX., No. 3.

*

SHANGHAI - MANILA



August, 1912.

Contents

OREIGN ADVISERS FOR CHINA

AGEMENT OF CHINESE
RAILWAYS

HE SHANGHAI - NANKING RAILWAY

SIDELIGHT ON CHINESE
CONTROL OF JOINTSTOCK COMPANIES

HINA MERCHANTS'
STEAM NAVIGATION
COMPANY

HE MINES OF THE ORIENT
ROPERTIES OF THE HOKKAIDO TANKO KISEN
KABUSHIKI KAISHA
(HOKKAIDO COLLIERY

HE 50,000th LOCOMOTIVE OF THE AMERICAN LOCOMOTIVE COMPANY

AND STEAMSHIP CO.)

UBBER-GROWING INDUS-TRY OF THE PHILIPPINE ISLANDS

OTOR CAR INDUSTRY OF THE FAR EAST

DMPANY REPORTS

AND WIRELESS

LECTRIC LIGHT AND
POWER PLANTS

DUSTRIAL PLANTS

IPPING AND SHIPBUILD-

ILDINGS

ARBOUR WORKS, CANALS,
IR RIGATION AND
WATERWORKS

AILWAYS

DADS AND BRIDGES
NES AND MINERALS



Hon. W. CAMERON FORBES Governor-General of the Philippine Islands

The degree of Doctor of Laws was conferred upon Governor-General W. Cameron Forbes of the Philippines by Harvard University at the commencement exercises on June 20

Hongkong and Shanghai Banking Corporation

DEPOSITORY OF THE GOVERNMENT OF THE PHILIPPINE ISLANDS

Capital (Paid in Cash)\$15,000,000 Sterling Reserve Fund......\$15,000,000

Silver Reserve Fund.......\$16,750,000 Reserve Liability of Prop'rs...\$15,000,000

KOBE

GOURT OF DIRECTORS:

E. SHELLIM, Esq. Chairman

F. H. ARMSTRONG, Esq. Deputy Chairman.

ANDREW FORBES, Esq.

G. FRIESLAND, Esq.

C. S. GUBBAY, Esq.

G. R. LAURENZ, Esq.

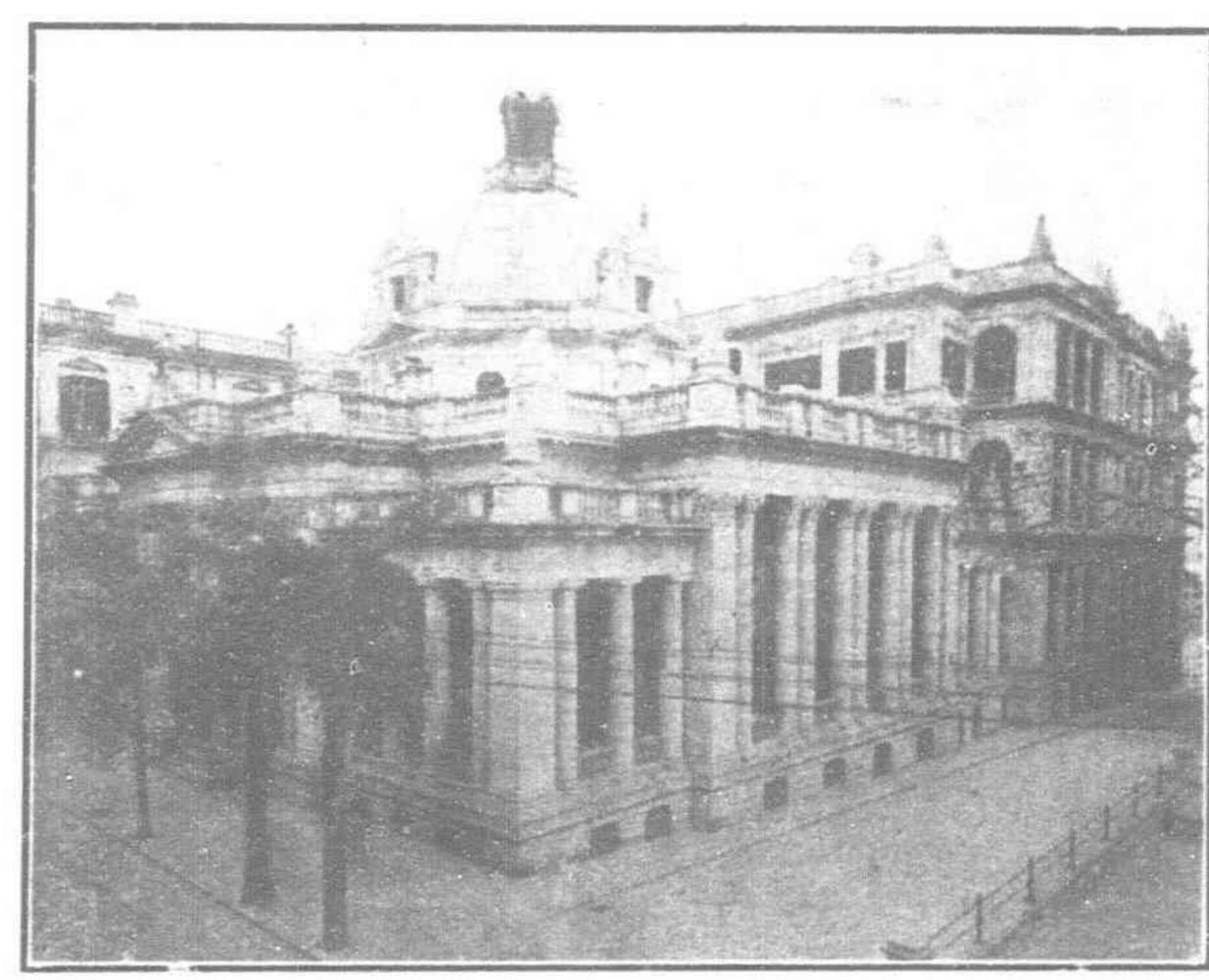
F. LIEB, Esq.

G. H. MEDHURST, E q.

W. L. PATTENDEN, Esq.

HON. MR. C H. ROSS

H. A. SIEBS, Esq.



Head Office, Hongkong and Shanghai Banking Corporation, Hongkong

BRANCHES AND AGENCIES:

LONDON AMOY LYONS BANGKOK MALACCA BATAVIA MANILA BOMBAY NAGASAKI CALCUTTA CANTON COLOMBO F00CH0W HAMBURG HANKOW HONGKEW (SHANGHAI) HONGKONG IPOH JOHORE

NEW YORK PEKING PENANG RANGOON SAIGON S. FRANCISCO SHANGHAI SINGAPORE SOURABAYA

TIENTSIN YLOILO KUALA LUMPUR YOKOHAMA

CORRESPONDENTS-In Samar and Leyte: WARNER, BARNES & CO., LTD. CORRESPONDENTS-In Cebu: KER & CO. LONDON OFFICE-31 Lombard St., LONDON BANKERS-London County and Westminster Bank, Ltd.

Interest Allowed on Fixed Deposits at Rates which may be Learned on Application. Credit Granted on Approved Securities and Every Description of Banking and Exchange Business Transacted. Drafts Granted on London and the Chief Commercial Places in Europe, India, Australia, America, China and Japan.

N. J. STABB, CHIEF-MANAGER - - - HONGKONG

A. M. REITH, ACTING-MANAGER - - -

WADE GARDNER, Agent, 36 Wall Street, New York Mr. T. S. BAKER, Agent, 411 Montgomery Street, San Francisco

International Banking Corporation

HEAD OFFICE, 60 WALL STREET, NEW YORK

LONDON OFFICE, 36 BISHOPSGATE STREET, E.C.

CAPITAL PAID UP AND SURPLUS, \$6,500,000.00 UNITED STATES CURRENCY

THOMAS H. HUBBARD, President

H. T. S. GREEN, General Manager

BRANCHES

Bombay Calcutta Canton Cebu Colon City of Mexico

Empire, C. Z. Hankow Hongkong Kobe Manila Panama

Peking San Francisco Shanghai Singapore Yokohama

Agencies and Correspondents in all Principal Cities of the World Designated Depository for the Funds of the Government of the Philippine Islands and for the Funds of the Government of the Canal Zone General Foreign Business Transacted

Commercial and Traveller's Letters of Credit issued Bills of Exchange and Cable Transfers Bought & Sold

THE FAR EASTERN REVIEW

COMMERCE :-: ENGINEERING :-: FINANCE

VOL. IX.

SHANGHAI AND MANILA, AUGUST, 1912

No. 3.

FOREIGN ADVISERS FOR CHINA



DR. G. E. MORRISON
POLITICAL ADVISER TO THE CHINESE GOVERNMENT

Below we give brief sketches of the careers of the three foreign advisers already appointed by the Government of China. Although these appointments do not appear to have yet been promulgated in Presidential orders, there can be no doubt that they have been made, and in the case of Dr. Morrison at least, definitely accepted. These appointments

mark the beginning of the adoption of a policy that will commend itself to all who wish China well. With foreign assistance she may hope in time to surmount the obstacles which obstruct her path. Without foreign assistance if she manages to surmount them at all, it would only be after vexatious and dangerous delays.

The appointment of foreign advisers to all the great departments of state will immediately react beneficially on China, as she will regain the confidence of the great Powers, which has been seriously impaired by recent events. It may be expected that further appointments will be made shortly. The name of Mr. W. W. Rockhill has been

THE FAR EASTERN REVIEW

COMMERCE :-: ENGINEERING :-: FINANCE

GEO. BRONSON REA, M.E. PUBLISHER

W. H. DONALD, Editor

127 SZECHUAN ROAD,

SHANGHAI,

CHINA

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and Advancement of Trade in the Philippines and Far Eastern Countries

MANILA OFFICE:

PLAZA GOITI,

Wm. CROZIER, Manager

GREAT BRITAIN: SOLE ADVERTISING AGENTS

WALTER JUDD, LTD.

5 Queen Victoria Street, London, E.C.

GERMANY, AUSTRIA and SWITZERLAND SOLE ADVERTISING AGENTS:
RUDOLF MOSSE ADVERTISING AGENCY

JERUSALEMER STR. 46-49

Berlin, S. W. 19

SUBSCRIPTION RATES: Philippines, United States, Canada, and Mexico, \$2.50 U.S.C. per year. To all other countries in the Postal Union, \$3.00 per year. Single copies 25 cents, U.S.C.

ADVERTISING RATES will be mailed on applica-

REGISTRATION AS SECOND CLASS MATTER APPLIED FOR AT U. S. POSTAL AGENCY, SHANGHAI, CHINA

SHANGHAI AND MANILA, AUGUST, 1912

CONTENTS	
	AGE
Foreign Advisers for China	103
Dr. G. E. Morrison	105
Professor Nagao Ariga	105
Professor J. W. Jenks	106
Mr. Ivan Chen	107
Sidelights on the Management of Chinese Railways.	108
The Shanghai-Nanking Railway	168
A Sidelight on Chinese Control of Joint-Stock Com-	
China Merchants' Steam Navigation Company	110
	110
The Mines of the Orjent	113
Properties of the Hokkaido Tanko Kisen Kabushiki	
Kaisha (Hokkaido Colliery and Steamship Co.)	113
The Railways of Japan	117
Japan's Financial and Economic Condition in 1911.	118
Waterworks in the Philippines	119
Rebuilding Hankow	120
Reinforced Concrete Tests	121
Defiance Hub Turning Machine	123
Ventilation of the Pennsylvania Tunnels at New	701
York City Cubo	124
Sewerage System for Havana, Cuba	125
Lima Locomotive Corporation	125
Oil in Papua	125
"Javanic" Type Locomotive for the Dutch State	125
Railways, Java	126
Agricultural Machinery	126
New Japanese Enterprises	126
To Develop Indo-China	126
The 50,000th Locomotive of the American Locomo-	
tive Company	127
Rubber-Growing Industry of the Philippine Islands.	131
Trade Booming in the Philippines	139
"Via Siberia"	139
Motor Car Industry of the Far East	140
General Engineering and Contracting News	142
	-31

mentioned in connection with the general advisership. Mr. Rockhill like Dr. Morrison is a firm believer in China and the Chinese people, and has an invaluable knowledge of the country and its politics. Sir Francis Piggott, formerly Chief Justice in Hongkong and at one time adviser to the Government of Japan was mentioned for an appointment to the legal department but this post has since been tendered to Prof. N. Ariga, the eminent Japanese jurist. Sir Robert Bredon, whose career is too well-known to need emphasis, is mentioned in connection with the Customs. In connection with the Posts and Telegraphs Mr. Theo. Pirv is spoken of. He has had the advantage of a very intimate and through knowledge of the department.

Commandant Brissand Desmaillets of the French Army has been nominated to the post of adviser to the President in military affairs, but the nomination has been objected to and the appointment of a military adviser seems to be in abeyance. This is the case also in regard to naval, commercial, agricultural and educational affairs. Now that a beginning has been made, however, it may be expected that substantive appointments of foreign advisers in all departments will shortly be announced and an important step thus taken towards the reorganization of China.

RAILWAY ADVISERS

To the readers of The Far Eastern Review the posts of Advisers to the Railway Department are probably the most important, as on the selection of competent and broad minded men for this work hinges to a large extent the future equipment of the projected network of lines which must cover the country. Several well-known men have aspired to this post.

The fear of creating a situation in the Railway Department where under given conditions, they could be compelled by diplomatic pressure, to cede permanent foreign control during the currency of existing railway loans has cause the Chinese to hesitate before committing themselves to accepting the services of a strong, capable Adviser. The danger of duplicating the conditions existing in the Customs, has been the real reason why China has steadily refused to employ a foreign railway consulting engineer, in this capacity. It is just possible that if China was approached from a different angle, and urged to employ foreign consulting engineers, general traffic director, or other specialists in their various departments all under the control of the Minister of Railways, and responsible to him alone, there would be some probability that the recommendations would receive more careful consideration.

The attitude of The Far Eastern Review towards the employment of Railway specialists under the name of Advisers, has already been set forth in previous issues. There is too much at stake for foreign manufacturers of railway material for us to advocate the appointment of any particular man for the post of general Railway Adviser, or Consulting Engineer. It is extremely difficult, if not altogether impossible, to find a competent railway engineer of any nationality free from the prejudices of his class, and who would give to manufacturers of countries other than his own, a square deal in the drawing up of specifications for materials.

To obviate the certain clash that would arise by the appointment of a Railway Adviser of any given nationality we are of the opinion that the one safe and sane course for the Chinese Government to pursue is to appoint a temporary commission of expert foreign railway engineers, composed of one British, one American, one European, and at least two of her own best men such as Jeme Tien-yu or Yen Te-ching, with full powers to draw up a standard set of specifications for the rolling stock and equipment of Chinese Government lines. Or, as an alternative, there must be some elasticity in the specifications drawn up by the engineers of various lines, that will permit manufacturers of all nations a fair chance to compete.

For the above reason The Far Eastern Review considers the appointment of any Railway Adviser whose powers would permit him to unduly discriminate against manufacturers other than those of his own nationality as inimical to the best interests of China. For the observance of Fair Play and the maintenance of the Open Door or principle of Equal Opportunity for all, and to avoid future ill feeling, which must lead to diplomatic protests on the part of foreign Powers, the course suggested above is the one safe guide for China to steer by.

This is the only phase of the matter which interests foreign manufacturers.

If China desires a Railway Expert, and avoid international friction in the future, there is ample scope for his useful employment in reforming the administrative and traffic departments of the service. Here awaits a brilliant field for some one to make a record in, providing China is willing to follow his advice. The appointment of a high class efficient Foreign Traffic Director who would devise some system of uniform rates and traffic management, and increase the earning capacity of the lines, would undoubtedly meet with the hearty approval of all national interests.

Mr. A. W. U. Pope, C. I. E., who has had 30 years experience in Indian Railways and enjoys a reputation justly earned as a capable Traffic Director and general Railway Manager, has been mentioned for a post in the Railway Department. Mr. Pope's work as General Manager of the S.-N. R. is reviewed at length in another column. His record on this line, speaks for itself.

DR. G. E. MORRISON POLITICAL ADVISER

Perhaps no action of the Chinese Government could have placated foreign opinion more than the appointment as political adviser of Dr. G. E. Morrison. One of the greatest misfortunes that attended the earlier months of the Republic was the absence of a strongminded, well-informed and sympathetic foreign adviser. The obstacle, of course, was the exaltation of mind that not unnaturally followed the destruction of Manchu power. The downfall of the dynasty which has been desired for so long seemed almost impossible of achievement, but when the spark of revolution was struck, the flames spread through the country with almost incredible rapidity. This sudden and spectacular success inspired in the Chinese a belief that they were mentally equipped to solve any problem that might be presented to them; they considered that, as they had been able unaided to overturn a dynasty that seemed to be so firmly rooted that no political storm could affect it, they were qualified to navigate the ship of state without advice or assistance. The heavy weather that has already been encountered has caused a readjustment of these views, and the first practical outcome has been the selection of the famous Times correspondent as political adviser.

The choice is a most excellent one and will commend itself to Chinese and foreigners alike. The Chinese will be pleased, because Dr. Morrison has consistently shown a profound liking for, and a sympathetic understanding of, the people of China. Although representing a great British paper that enjoys an almost semi-official standing, Dr. Morrison has never allowed any desire to promote British interests to interfere with his determination to secure fair play for China. Those words, in fact, explain at once his policy and his success. Fair play for China has been his motto throughout, and although during the Manchu régime he fearlessly attacked nepotism and corruption in high places, it has been thoroughly recognised that he did this in the best interests of the country. The "predatory Powers" as those nations who had designs on China's territories have been styled, constantly squirmed under the lash of his pen. Russia's cynical and high-handed action in Manchuria was early exposed in The Times and this was by no means the only case in which Dr. Morrison played the part of unofficial watchdog of China's interests. The Chinese know that with Dr. Morrison as adviser they will have more than filled the gap left when Sir Robert Hart ceased active work. They have secured the services of a man whose intellectual capacity is recognized in every quarter of the civilized world; whose fearless integrity has been again and again manifested, and whose sympathetic understanding of the Chinese people will enable him to consider problems from their view point as well as weigh them on general principles.

Foreigners will hail the news of his appointment with gratification because his sympathy with the Chinese has never been able to subvert his judgment. Other men have yielded to the subtle fascination that the Orientals often exercise over Occidentals who begin to understand them, and the result has been that they became simultaneously pro-oriental and anti-occidental. The clarity of mind and soundness of judgment which characterize the eminent correspondent, have saved him from this fate, and any expression of opinion from him has been accepted without question as the genuine view of an especially well-informed and thoroughly unprejudiced observer, who had got close to the heart of Far Eastern things without losing a tittle of his sturdy individualism. Respected and trusted by Chinese and foreigners, Dr. G. E. Morrison in his new position will have a more extended field for the exercise of his great mental and moral qualities, and that he will add to his fame and place China under the heaviest of obligations to his sagacity and foresight is as sure as anything mundane may be—if he is given a free hand.

Dr. Morrison's career is too well known for it to be necessary to give here more than the slightest of sketches. He was born in Victoria, Australia, fortyfive years ago, so he is comparatively a young man. That he was of an adventurous disposition was shown by his feat of walking across Australia when he was eighteen. Exploration in New Guinea next engaged his attention. The expedition was attacked by cannibals and Dr. Morrison received two serious spear wounds. While he was recovering from these wounds in Edinburgh le took his medical degree. Thereafter he worked on a schooner in the South Seas in order to study the Kanaka question; served as a purser on a vessel in the West Indian fruit trade, and for some little time enjoyed the distinction of being Court Physician to the Shereef of Wasan in Morocco.

His association with the Times came about in a strange but eminently fitting way. He owed his appointment to himself alone. After making a marvellous trip through China alone in 1894, he published a book "An Australian in China," describing his journey. This volume was read by the late Mr. Moberley Bell, the Manager of The Times, and he lost no time in getting in touch with Dr. Morrison and commissioning him to journey through Indo-China and the adjacent region and to supply The Times with special articles. The wonderful discrimination Dr. Morrison exhibited and his rapid assimilation of knowledge in connection with this work marked him out as the man to fill the important post of Times correspondent at Peking which was then vacant. This was offered to him and accepted, and a new force arose in China. Dr. Morrison in his capacity

as correspondent has had to fight against powerful influences—the opposition was not always and altogether in quarters remote from his own legationand he has been subjected to attacks open and covert. That he has always emerged successfully from struggles of this nature proves not only his magnificent courage, but the strength of the causes for which he elected to do battle. It will be remembered that Dr. Morrison's unique knowledge of Far Eastern affairs, which enabled him frequently to forestall the Foreign office, led to Lord Curzon describing Dr. Morrison's statements as "the intelligent articipation of events before they occur," a witticism that was untrue as it was cheap. Dr. Morrison was among the besieged in the British Legation during the Boxer rising and he did magnificent work in the defence. If anything he was too daring and he received another wound during one of the attacks.

China is to be congratulated on this appointment without any qualification or mental reservation. She has secured the services of a man whose reputation for sturdy courage and devotion to duty is beyond cavil, and whose power and desire to see her peaceful, happy, and progressive march hand in hand.

PROFESSOR NAGAO ARIGA JUDICIAL ADVISER

No hope is more cherished among the Chinese than that the time will speedily come when extra-territoriality will be finally banished. Until this is done China cannot aspire to the status of a first class power. To reorganize and reform her legal system is the first step, and Professor Nagao Ariga, an eminent Japanese jurist, has been appointed judicial adviser to supervise the carrying out of this most important work, possibly in collaboration with Sir Francis Piggott. It is possible that the Government of China had in mind when making this appointment the conspicuous success that had followed the engagement of Dr. Tokichi Masao by the Siamese Government as legal adviser. As a member of the commission on the codification of Siamese laws which was appointed in 1898 Dr. Masao did invaluable work and the result, as readers may recollect, was the abandonment by Great Britain in 1907 of her rights of extra-territoriality in Siam.

The selection of a qualified Japanese jurist for this advisership is based upon the fact that Japan is the one country which has been confronted with similar problems to those which now face China and has overcome them. Extra-territoriality prevailed in Japan from the time that the country was opened up by Commodore Perry. The Japanese quickly realized that the only means of abolishing extra-territoriality was to remove the cause of its existence. Consequently they set to work, under

competent advice, to codify their laws and bring them up to the standard of the more advanced countries. Simultaneously they began to train men efficiently to fill the judicial positions. When the Powers saw that the safety of their nationals could be trusted to the laws of Japan and the administrators of those laws, they were unable to refuse the request for the surrender of their extra-territorial rights. A Japanese judicial adviser will be, consequently,

a special study of National Jurisprudence. After his return to Japan he was appointed Secretary to the Privy Council, and he took a prominent part in the arrangements for putting the constitution in force. During the war between Japan and China, he became adviser on international law to the General Commanding the Second Army. Subsequently, while on a visit to Paris, he published in French 'An Essay on International law concerning the China-

international law, sociology, etc. Among his better known works are "A History of Modern Diplomacy," "The Diplomatic History of the Last Thirty Years" and "Commentaries on the laws of Acient Japan." Professor Ariga is a native of the Settsu province of Japan and was born in 1860.

PROFESSOR J. W. JENKS FINANCIAL ADVISER

In view of the precarious position of China at the present time the choice of



Professor Nagao Ariga Judicial adviser

invaluable to China at the present juncture as he will be able to explain the methods by which Japan succeeded in regaining her national independence.

Of the professional qualifications of Professor Ariga to cope with the difficult problems that will be submitted to him, his past career furnishes conclusive testimony. He took his degree of Ph.D. at the Imperial University of Tokyo in 1882, and afterwards went to the University of Berlin, where he made

Japan War." In 1893 he was appointed lecturer on International Law at the Imperial Military College, and in 1899 was the representative of Japan at the Peace Conference in London. During the Russo-Japanese War Professor Ariga's advice on questions of international law was frequently requisitioned and he was officially attached to the Manchurian forces as adviser.

Professor Ariga has written a large number of books on jurisprudence,



PROFESSOR J. W. JENKS
FINANCIAL ADVISER

the best available authority as financial adviser was of paramount importance. The influence for good that can be exercised by a thoroughly competent and high-minded financial adviser is scarcely less than that which will flow from the office of the political adviser. China will be made or marred by the political and financial policy she follows during the next few years. Therefore the selection of Professor J. W. Jenks as financial adviser to the Government has

been welcomed by all well-wishers of China, foreign or native. It is true that Professor Jenks cannot claim the long and intimate acquaintance with China and the Chinese that will prove of such inestimable service to his colleague in the political department, but he has made a special study of China's finances, especially in regard to the currency problem, and probably no foreign expert living knows more about the subject which will be his especial care. The exhaustive examination he conducted in 1903 and 1904 in connection with the currency question led to the submission of a most valuable report containing recommendations for reform, including the establishment of a gold standard. Probably Mr. Jenks will devote his attention in the first place to getting something like order out of the currency chaos, and success in the work alone would be sufficient to establish his claim to be considered as a lasting benefactor of China. The international financial engagements of China are so complicated that it will require all Professor Jenks energy and accumulated experience to reduce them to a system. Necessarily allied with this is internal finance. It has long been a belief of well informed foreigners, including the late Sir Robert Hart, that an equitable land tax alone, while actually decreasing existing burdens, would return a revenue sufficient to pay all China's administrative expenses, provide for the payment of interest on foreign loans and the establishment of a sinking fund. It may be that when Professor Jenks brings his expert knowledge to bear upon the data collected by the Finance Department he will be able to solve the domestic financial problems in a manner more satisfactory than now seems within the bounds of hope.

A brief sketch of Professor Jenks' career will be of interest. Jeremiah Whipple Jenks was born in St. Clair, Michigan, on September 2, 1856. He took his A.B. degree at the University of Michigan in 1878 and his A.M. degree in 1879. Admitted to the Michigan Bar in 1881, he taught Greek, Latin and German at Mt. Morris College between 1879 and 1880 and between 1881 and 1883. He was professor of political economy and English literature at Knox College from 1886 to 1889; professor of political economy and social science at Indiana University 1890-91 and professor of political economy and politics at Cornell since 1891. In addition to his scholastic work Professor Jenks has been active in a wider sphere, as the following brief survey will show:-He was expert agent of the U.S. Industrial Commission on Investigation of Trusts and Industrial Combinations in U.S. and Europe, 1899-1901, and consulting expert of U.S. Department of Labor on the same subject; special commissioner War Department, to investigate questions of currency, labor, internal taxation and police in the Orient, 1901-2; special



MR. IVAN CHEN

expert on currency reform of the Government of Mexico, 1903; member of the U.S. Commission on Internal Exchange in special charge of reform currency in China 1903-4, member of the U.S. Immigration Commission 1907.

He has been a voluminous writer and in addition to the numerous reports of Commissions which he edited and largely wrote, he has published volumes on subjects so remote from each other as "Great Fortunes, their winning and using" and "The Political and Social Significance of the Life and Teaching of Jesus."

Professor Jenks took his LL.D. at his Alma Mater in 1903 and his doctorate of philosophy was obtained at the University of Halle as early as 1885. He married in 1884 Georgia Bixler of Mt. Morris, Illinois.

MR. IVAN CHEN

Mr. Ivan Chen is the present Commissioner for Trade and Foreign Affairs in the foreign Settlement of Shanghai. He is the representative of the Peking Government. Mr. Chen was born in Honan in 1870, and commenced his study of English when he was 16, his foreign education beginning in the Kiangnan Arsenal School, Shanghai.

As a result of a competetive examination he was selected by the Viceroy of Kiangsu to go to Peking to join the old Tsung Li Yamen, or Foreign Office, and in 1896 he was sent to England to study law. He joined Lincoln's Inn, London, in March, 1897, and was called to the bar in Nov. 1899. Upon the recommendation of Sir Chen Tung-liang, K.C.V.O., Chinese Minister in London, Mr. Chen was appointed by the Government to the position of student interpreter to the Chinese Legation in London, and from that time rose until he reached the post of First Secretary in 1905. In 1906 he was placed in charge of the Legation during the absence of the Minister for six months in China. In 1902 Mr. Chenwas one of the International Exchange Commission initiated by the American and Mexican Governments with the object of devising a stable currency for China. Professor Jenks, now

mentioned as Financial Adviser to China, was also one of the Com-In 1904 Mr. Chen, with Sir Halliday McCartney, negotiated the Chinese Labor Convention for South Africa. In 1907 he was recalled from his position as First Secretary to the Legation to Peking to join the Foreign Office, and there participated in the negotiation of the Opium Convention of May 8, 1911. In the summer of 1911 he was appointed Taotai at Tengyueh, and had reached Rangoon, on his way to the distant post when the revolution broke out. Recalled to China he went into private life, and took no part in public affairs until peace had been declared, when he was asked by the then Minister of Justice, Dr. Wu Ting Fang, to preside at the first jury trial in China. The proceedings were conducted according to the rules of procedure obtaining in England. In May, 1912, Mr. Chen was called to his present post to succeed Mr. Wen Tsung Yao. The present disturbed state of affairs makes the duties of the Commissioner onerous in the extreme, but being diplomatic and tactful, and desirous of doing the correct thing in all matters, Mr. Chen succeeds admirably, when the chaotic state of things is remembered, in averting friction with

SIDELIGHTS ON THE MANAGEMENT OF CHINESE RAILWAYS

THE SHANGHAI-NANKING RAILWAY

Probably no railway in China has been subjected to more criticism than the line from Shanghai to Nanking, built under a loan agreement between the Chinese Government and the British and Chinese Corporation, Ltd. Most of these criticisms have emanated from the Chinese, and arose primarily because of the capital cost per mile of line, which, including flotation expenses, purchasing commissions, interest and other charges exceeded the cost of other similar lines constructed in China. The charge of extravagance was freely made. Owing to the expensive character of the line and rolling stock, and the Chinese likin tax system operating against any large freight traffic, it was maintained that it would take many years before the line could begin to pay its fixed interest charges. These conditions were fully set forth in the Special Issue of The Far Eastern Review of November 1909, on "Railways in China," and the history of the line to 1907 was fully given in the admirable Report of Mr. Collinson, the Engineer-in-chief. This report still stands as the only complete and technical exposition of the itemized cost of constructing railways in China, as no other engineer or railway director has permitted full publicity to these important details. In January 1907, a competent Foreign Traffic Manager was appointed, and from this date the open work of the line may be said to have started. The railway at that time was opened to traffic as far as Wusih or only 90 miles. The dates the various sections were opened to traffic, are as follows:-

70		
OPENED TO TRAFFIC	MILES	TOTAL MILEAGE
9/10/1904	10.19	10.19
20/11/1905	10.70	20.89
18/7/1905	69.10	89.99
w. 15/5/1907	24.14	114.13
15/10/1907	46.40	160.55
1/4/1908	42.68	203.21
	TRAFFIC 9/10/1904 20/11/1905 18/7/1906 w. 15/5/1907 15/10/1907	OPENED MILES TO TRAFFIC 9/10/1904 10.19 20/11/1905 10.70 18/7/1905 69.10 w. 15/5/1907 24.14 15/10/1907 46.40

It is from this date then that the operation of the line should be studied, and although laboring under heavy handicaps the results obtained should form the basis of further comment.

During 1907 the working accounts were complicated by the existence side by side with the open working line, of a great amount of capital work for completion of the still unopened sections. Part of the cost of operation was thus debited to capital, and engineers and others who served both open line and construction draw salaries debitable to both heads. The Railway was still administered by the Board of Commissioners with a Foreign Chairman, and consisted of three Foreigners and two Chinese, one of the former being the Engineer-in-Chief, ex-officio. It was not till June, 1908 that the proper open line work began. The Administration was then altered. The Foreign Chairman and Board of Commissioners were superseded by a Chinese Managing Director, to whom was entrusted the duties of the Board but subject to its general appellate control. The Chinese Managing Director in turn was advised and supported by a General Manager, responsible for all the technical work and guidance of all the various technical heads of departments.

(Continued from page 107)

foreigners. His task is one of great delicacy owing to the element which exists across the border at Chapei with apparently no other intent than to cause an open rupture of present relations.

In June 1908 the undertaking began to bear all the working cost as a revenue earning project, and all charges to capital were practically closed. In other words the history of the Railway commenced from that period.

The results year by year from 1908 to 1912 are as follows:—

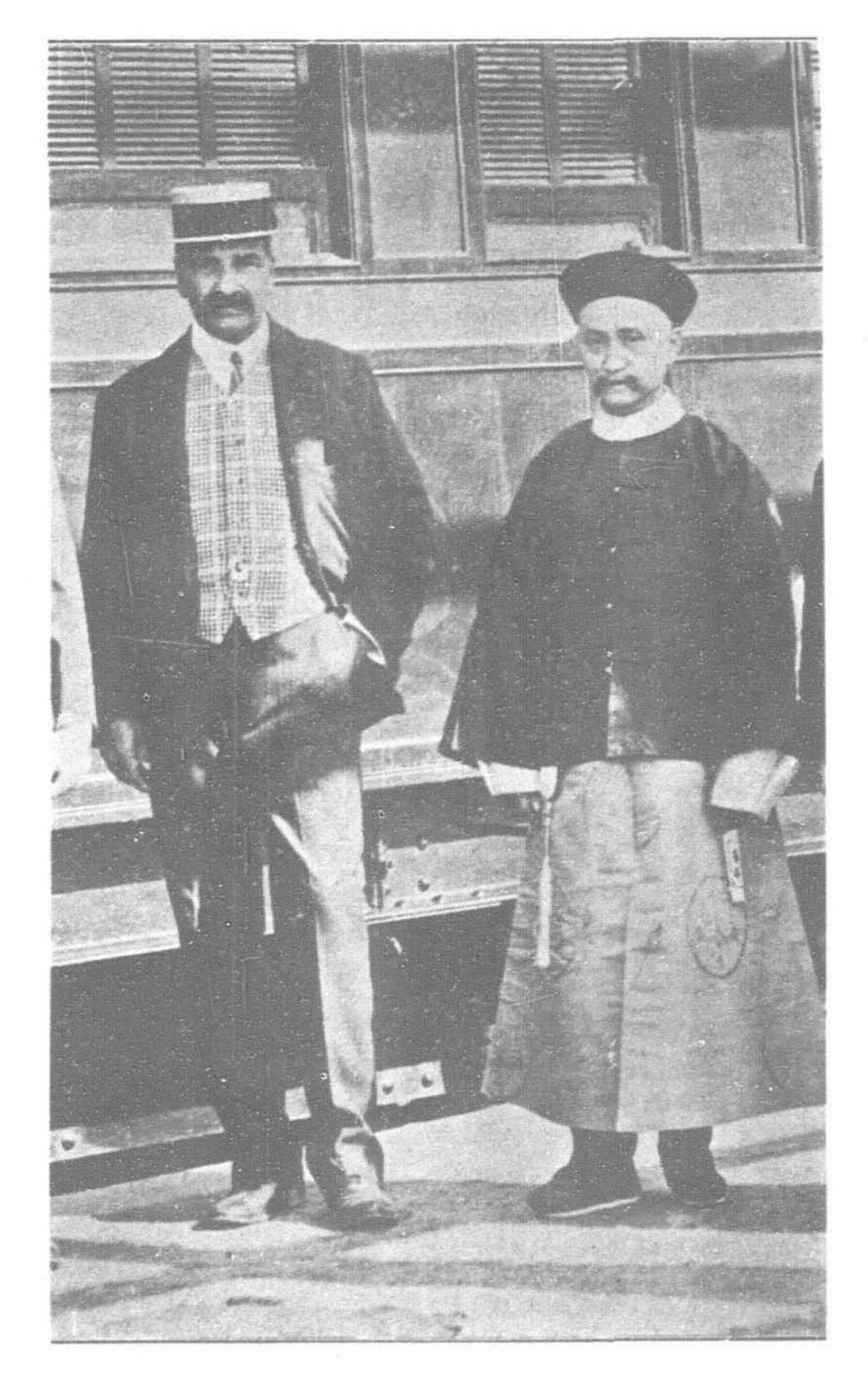
than last year. The working expenses will be 8% less than last year, and 6% less than the budget. The net revenue for the half year ending June, 1912, will show a greater increase than any whole year did before that time, and the line will almost pay its 5% guarantee in the fourth year of its open line work.

YEAR.	GROSS EARNINGS			Working Expenses		NET	INCRÉASE	
	Passengers \$	Goods \$	Sundries \$	Total \$	\$,	G. E.	EARNINGS \$	DECREASE \$
1908 1909 1910	1,303,977 1,552,655 1,766,827 1,045,417	141,219 189,110 207,889 230,163	75,282 54.318 43,633 66,492	1,610,478 1,796,083 2,018,349 2,251,072	1,092,663 1,214,517 1,390,678 1,490,186	67.85 67.62 68.00 66.20	517,815 581,566 627,671 760,886	63,751 46,105 133,215
For 5-year ended June 1911	891,991	131,493	34,180	1,057,664	690,232	65.26	367,432	
For 3-year ended June 1012		152,874	26,568	1,407,000	821,000	58.4	586,000	(a). 205,429

(a) It will be noticed that the improvement for the half-year ended June 1912 is greater than that for any two of the previous years put together.

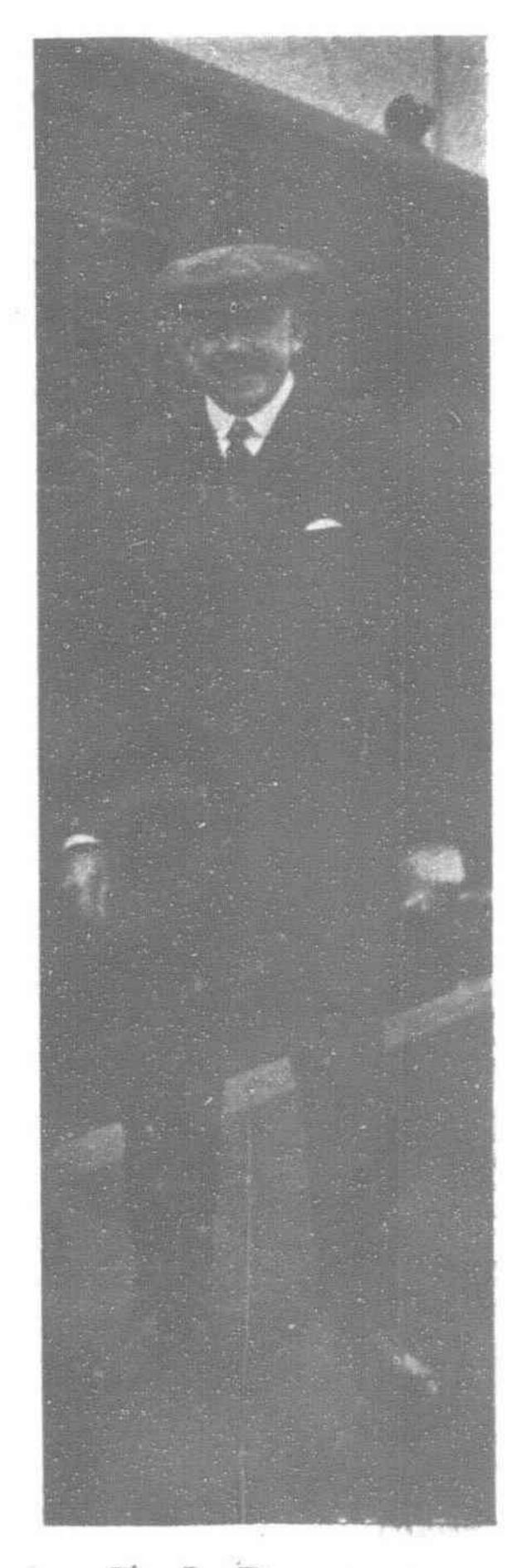
Revenue has increased yearly; the working expenses have steadily decreased in percentage on the gross Revenue, and the net Revenue has increased in the same proportion, till now, with the available figures up to July, 1912, the gross Revenue in 6 months is nearly \$400.000 better

These figures are highly eloquent and speak for themselves. It will be noted that the increase is traceable to the passenger earnings, and the line is reversing the accepted theory that revenue must come from the freight or goods traffic. It is interesting to study the methods whereby such a result was secured.



A. W. U. POPE, C.I.E. I GENERAL MANAGER

MR. CHUNG MUN-YEW
MANAGING DIRECTOR



E. J. DUNSTAN LOCOMOTIVE SUPERINTENDENT

(SHANGHAI-NANKING RAILWAY OFFICIALS)

When Mr. Pope assumed charge of the traffic department of the line, in January 1907, the passenger rates corresponded with those in force on other Chinese government lines, as follows:—

6 cents (Mex.) per mile 1st Class.
3 cents ,, ,, 2nd ,,
2 cents ,, ,, ,, 3rd ,,

A careful study and analysis of the capital cost of construction of railways in other parts of the world, and especially in India, where conditions are similar to those in China, convinced the new Traffic Manager, that the rates charged by the Shanghai-Nanking Railway were unduly excessive and that no great increase in traffic could be hoped for unless the fares were reduced to the lowest possible point. The third class fares in England, where the average capital cost per mile is over £67,500 was 31/2 cents (Mex.), and even in the United States the average 3rd class rate was about 21/2 cents. The average capital cost of Indian Railways works out to about £9,100 per mile, and the average of the actual 3rd class fares charged was about \% of a cent.

As the average capital cost per mile in China, conditions of living, scale of wages, quality of transportation and other railway characteristics were almost identical with India and taking into consideration that the Indian Railways had been built up under a fixed policy extending over a period of 26 years of low passenger rates (averaging 3/3 per cent per mile) producing an average net profit representing 5% on the capital invested, the Traffic Manager of the Shanghai-Nanking Railway line forcibly advocated a lowering of the rates then in force.

With the lowest passenger rate of nearly 2 cents a mile, the fare between Soochow and Shanghai (54 miles) was \$1.05. The boat and launch service plying on the creek and canals between these two populous centers, carried passengers at 50 cents a head. This included two free meals, and a place to sleep, with the additional advantage of discharging the passenger in the center of the cities, instead of the outskirts. Under such conditions it was evidently absurd to expect them to travel by the Railway at more than twice the fare. To meet and

overcome this severe competition it became imperative to lower the rates to at least one cent a mile, or forego any hope of building up a profitable railway passenger business.

As a result of Mr. Pope's recommendations the Board authorized a general modification of fares, which although not on a strictly mileage basis, worked out approximately to one cent a mile for 3rd class, two cents a mile, 2nd class, and four cents a mile for 1st class.

In other words the Board adopted the maximum 3rd class rate in India, as the minimum of the Shanghai-Nanking Line. The schedule of maximum and minimum passenger fares in India applicable to all railways, as fixed under Government Orders dated 16 July 1891, and modified Dec. 14th 1896, is as follows:—

Maximum per mile. Minimum per mile.

1st Class. 18 pies (6 cts.) 12 pies (4 cts.)
2nd ,, 9 ,, (3 ,,) 6 ,, (2 ,,)
a little over
Intermediate
$$4\frac{1}{2}$$
 ,, (1 ct.) 3 ,, (1 ,,)
3rd Class. 3 ,, (about I ct.) $1\frac{1}{2}$,, $(\frac{1}{2}$,,)

As a result of these rates, the passenger traffic in India has increased since 1892 from 127,000,000 to 371,000,000 in 1910, and the receipts from £5,163,000 to £11,413,600, an increase of 121 per cent in the same period. This policy which had operated to such good advantage in India when put into practice in China worked out along the same lines, and the increase in passenger traffic on the S. N. R. was immediately noticable. A comparison of earnings between Shanghai and Wusih in 1907 under the reduced rates, with the same period for the preceding year 1906, showed that in 1907, the number of passengers carried was 534,954 earning \$196,168 as against 196,505 passengers in 1906 earning \$105,551. Pending the abolition of the Likin Tax Charges which operate against any large increase in the goods traffic, it is only by the development of the passenger traffic at the lowest rates that the line can hope to pay, and the steady increase in this traffic as shown on the table forcibly testifies to the wisdom of the policy.

TABLE A

	Imperial Railways of North China,		Imperial Railways of North China, Shanghai-Nanking Railway.			ilway.
Year.	Number of Passengers.	Average Mileage worked.	Average No. per mile worked.	Number of Passengers.	Average mileage worked.	Average No. per mile worked.
1905	3,137,754	564	5,563	Not open		
1906	3,363,206	562	5,984	982,637	53	18,540
1907	3,276,202	572	5,728	1,843,450	115	16,030
1908	3,202.967	600	5,338	3,273,790	192	17,051
1909	3,603,303	603	5,976	3,538,701	203	17,432
for 15	months)					
1910	3,239,158	603	5,372	4,488,952	203	22,109

The following gives the money values for the above:-

	Imperial Railways of North China.		Shanghai-Nanking Bailway.			
Year.	Amount earned	Average mileage worked.	Ave. Receipts per mile worked.	Amount earned for Passengers.		Ave. Receipts per mile worked
	\$		8	\$		\$
1905	5,136,771	564	9,108	Not open		
1906	5,755,828	562	10,242	328,485	53	6,198
1907	5,046,139	572	8,822	763,938	115	6,643
1908	4,898,633	600	8,164	1,393,591	192	7,258
1909	6,043,573	603	10,023	1,552,258	203	7,647
(for 15	months)			-		
1910	5,141,402	603	8,526	1,766,338	203	8,701

It will be noticed that whereas on the Nothern Railways there was a distinct downward tendency for the four years ending 1909 (due allowance being made for the extra 3 months figures in that year) with an increasing mileage, the Shanghai-Nanking Railway shows a steady and marked upward tendency.

In view of the undoubted success of the low rate of 1 cent per mile, resulting in such a remarkable passenger development on the S.N. Railway it is interesting to compare the results with those secured on the Government Railways of North China. This line is also mortgaged to the British and Chinese Corporation, and under the terms of the loan, has a foreign Director, Engineer, Traffic Manager and other important officials.

This line holds an enviable position amongst railways, returning about 18 per cent profit in the capital invested. A third class rate of 2 cents per mile is charged on the Northen Railways. It has no water competition and enjoys the advantage of longer hauls. The published accounts of the Northern compared with the Shanghai-Nanking line show the following:—

(See Table A)

We have before us the published returns of the Peking-Hankow Line and a further comparison with the results of this Railway where the 3rd class fare is about 2 cents per mile, is also interesting and elucidating.

Year	Total number of passengers	Mileage worked	Average per mile
1906	1,418,037	787	1,802
1909	1,886,817	815	2,315
1910	2,165,837	815	2,657

The money values of the above are:-

	\$		\$
1906	2,459,906	787	3,126
1909	3,153,310	815	3,869
1910	3,688,131	815	4,525

It will be seen that the above compare very unfavourably even with the figures for the Imperial Railways of North-China and still more so with the figures for the Shanghai-Nanking Railway. The 3rd class fare is about 2 cents a mile (Peking to Hankow distance 752 miles, fare \$15,00) and the figures queted afford a striking comment upon the fact.

It is clearly evident that the rate policy laid down by Mr. Pope and wisely adopted by the Board, if left alone for a number of years must bring satisfactory results to the bondholders and the Chinese Government. The figures show that the Shanghai-Nanking Railway is now carrying more passengers per mile open, than any railway in India or China, and nearly as many per mile of line operated as some of the busiest metropolitan railways in the world. The earnings are steadily increasing, and the proportion of working expenses to gross earnings are decreasing with the result that for 1911 the line has practically paid 21 per cent on the nominal value of the Loan Bonds or nearly half the interest charges, and at the present rate of increase it will cover the 5 per cent on its capital in the next working half year. Such a result considering the handicaps under which the line is operated is highly creditable to the management, and comes within the limits of sound railway principle as incorporated in the Indian Government Railway code. To be classed as productive work and sanctioned for construction by the Government, a railway in India must show good reason to believe that it will earn its guaranteed interest in 5 years after it has been constructed and open to public traffic. In India under a fixed sympathetic policy and close harmony between the government and railways, where the dominant idea is to smooth over difficulties and facilitate the development of the lines, this five year limit is a liberal one for the railway management.

If any credit is due to the management of a line in India, which pays its guaranteed interest in five years a much larger measure of praise is fairly due to any railway manager in China who in the same period reaches the desired goal, in the face of existing conditions.

In the management and operation of a railway in China, under a system which creates sinecures for the employment of a horde of hangers-on and political favorites, it is natural that the percentage of operating expenses would be much larger than if true economy was practised and the lines operated as a purely business proposition. The history of State owned and operated lines is the same in most parts of the world, as political influence is generally stronger than efficiency and merit in securing employment. This system has reached its limit in China, where two or more employees are found to do the work of one, and on some railways there are three station masters who stand around look wise, sport a uniform, draw the pay and pocket the squeeze while one man does the real work. And yet the lines pay.

On lines under the direct control of the Chinese Government such practices are their own concern and is nobody's business. Even on loan built lines, which are the property of the Chinese Government and the earnings mortgaged to the financing syndicates, the practice of overloading the pay roll with an excessive Chinese staff, is also a matter which concerns only themselves, provided the interest on the bonds is regularly paid. If the Chinese Government feels that it is necessary to employ a large Chinese staff to check the work of the foreign officials or educate its people in railway operation, and is willing to pay for this luxury and saddle the road with extra expense, or in other words if they wish to take their share of the profits by distributing it in patronage, and make up the deficiency in the

still their own business.

The foreign managers of loan built roads contend that if they were freed from the excessive number of Chinese employed in sinecures, the profits of the lines would be greatly increased and the working expenses reduced to a percentage on gross earnings far below any other railways in the world. On the other hand the Chinese justify their position

interest on the bonds from other sources, it is

on the grounds that the lines are the property of the Chinese Government, and employment should be found for Chinese wherever possible. and that the foreign staff should be reduced to a minimum. They maintain that the loan agreements have saddled the lines with an excessive and expensive foreign staff which could be greatly reduced, and the work done by Chinese and the same results secured. If the Chinese selected honest and efficient men they would be amply justified in their stand, but until such time as they develop trained railway men, the foreign staff must be accepted if the roads are to be financed and constructed with foreign capital. In reviewing the work of a loan built railway in China, ample allowance must therefore be made for this attitude of the Chinese Government, and its bearing on the financial results, which in turn reflect on the efficiency of the foreign management of the enterprise.

It is natural that both foreigners and Chinese should strive for increased pay, and that both sides would advocate the cutting down of the others salaries to increase their own. Hence a source of continual friction and dispute.

But granting that either side is justified in their stand, the fact remains that a great cut could be made in salary lists without injury to the railways, a reduction that would instantly be made, if the foreigner had full sway, or if the lines were operated by a private company, where profits were the lirst concern. As it is now, the operating expenses are unduly increased, and in the case of the Shanghai-Nanking Railway, delaying the time when the bondholders can secure a percentage of the profits under the terms of the loan agreement, and the Chinese Government is saddled with an nunecessary drain on its treasury. The Chinese on their part also advance the argument that the foreign staff is overloaded and that by practicing economy at this end a similar saving could be made, by reducing their salaries or employing Chinese in their stead. This situation is an interesting side light on the cost of operating a loan built railway in China.

It is quite clear however by admitting the justice of either side of the argument, that the operating cost of the Shanghai-Nanking Railway, could readily be reduced to a figure representing 50 per cent or less on the Gross Farnings without in the least impairing the efficiency of the line.

Aside from the gratifying results shown in the financial returns, the line has passed through a trying ordeal during the Revolution which taxed its limited carrying capacity to the utmost. The line was ill prepared to meet the urgent demands on its service by the revolutionary leaders for the transportation of troops to attack Nanking. The railway was barely equipped and manned for operating the regular daily service, and no provision had been made for running trains at night. By utilizing the road during the day for the usual passenger traffic, which was greatly augmented by the wholesale exodus of families from towns along the line seeking the safe precincts of Shanghai, and employing the same rolling stock at night for the transportation of troops and supplies to the front at Chinkiang and beyond, the line was able to fulfil all demands made on it by the public and the army.

The revolutionary leaders have freely admitted that their success in capturing Nanking was greatly facilitated by the able management of the railway during the crisis, thus enabling them to concentrate the army at the front without loss of time. So it may be fairly said that the management of the Shanghai-Nanking Railway has earned a place for itself which entitles it to all credit for the remarkable financial showing made, and praise for the skilful manner in which it was operated when put to the severest test that can be imposed on a

railway.

The success of the line is largely due to the efficiency of the Managing Director, Mr. Chung Mun-yew, one of the ablest officials of China. His intelligent grasp of railway matters, and cordial co-operation with the foreign General Manager, Mr. Pope, has made possible the excellent record above outlined.

A SIDELIGHT ON CHINESE CONTROL OF JOINT-STOCK COMPANIES CHINA MERCHANTS' STEAM NAVIGATION CO.

The cancer of corruption which has played such disastrous havoc with so many industrial enterprises under the management of Chinese has now brought the China Merchants' Steam Navigation Company to the verge of ruin. This, and the Han Yeh Ping Corporation (the Hanyang ironworks, Ta Yeh iron mine and Ping Hsiang Colliery Co.) are the largest Chinese managed concerns in the country, and both are in financial difficulties. The C.M.S.N. Co. is the only existing Chinese shipping enterprise of any magnitude exclusively controlled by Chinese, and the deplorable state of its affairs has been brought to public notice by the laudable efforts of a new Board of Directors to institute reforms, and the strenuous labors of the company's employees to baulk any measure destined to charge the old order under which they lived and grew financially fat at the expense of shareholders. Men well-known in China and the world like Wii Ting-fang and Wen Tsung-yao have been compelled, as Directors of the company, to publicly denounce the insidious corruption marking the working of the business, and the pother occasioned by the attempts to introduce reform has been so keen and has brought the concern so much into the public eye that it is interesting to trace its history and outline the steps which have led to the unpleasant and impossible situation in which the Directors and the shareholders find themselves to-day.

The Company owed its origin to the activities of two expectant Taotais of Tientsin in the latter part of the reign of Tungchih about 1872. They were Sheng Hsuan-huai (whose railway

nationalisation policy of 1911 may be said to have precipitated the recent revolution) and Chu Yuen-fu. Being of a commercial turn of mind, these men evolved the idea that the transportation of the tribute rice then being carried by junks on the Grand Canal from the Southern provinces might be profitably done by steamers, and receiving a favorable reply to a memorial on the subject sent by them to Li Hung-chang, then Vicerov of Chihli, they chartered two steamers, and commenced the work. It was not profitable. Expenses were so heavy that they were compelled to cast about for a means of averting further loss, and they endeavored to form a company. An appeal to merchants for funds met with no response, and even the solicitations of Tang King Shing—who was then compradore of Messrs. Jardine, Matheson & Co., and who was held in high esteem by both Chinese and foreigners, failed to produce material assistance for some time. Eventually, however, he enlisted the sympathies of a Cantonese tea and silk merchant, Hsu Yu-chih. In 1877 they negotiated with Russell & Co., managers of the Shanghai Steam Navigation Company, for the purchase of that company's fleet, and with a definite proposition to offer they were able to secure the support of the Nanking Viceroy, and, as a result, the Imperial Government contributed Tls. 2,000,000 with which to effect the purchase of the 17 vessels and the landed property, wharves, etc., of the S. S. N. Company. Thus the China Merchants S. N. Company became semi-official, though the officials dropped out when subsequent operations brought losses, the

Tls. 2,000,000 being deducted in instalments from the amount due by the government for freight on rice, though the Government retained its representatives on the Directorate.

Keen competition by Jardine, Matheson & Co., and Butterfield & Swire, brought continued losses instead of profits, and a conference led to a 10-year agreement to sustain uniform freight and passage rates, the agreement being renewed at the expiration of the period. It obtained, in fact, until the Franco-Chinese war, when the C. M. S. N. Co., decided to sell their vessels and property to avoid loss by seizure. Russell & Co. became the purchasers, the price paid being Tls. 5,000,000. The Censors in Peking did not fail to make a note of this transaction, and upon the conclusion of the war they impeached Ma Mei-su, the general manager who effected the sale, for disposing of the company to foreigners. Shen Hsuan-huai and Hsu Yu-chih consequently brought their influence to bear to recover the property from Russell & Co., but only succeeded in doing so after agreeing that all arms and ammunition required by the Government should be bought through Russell's house. The purchase price was the same as that paid, Tls. 5,000.000.

Rate cutting by the opposition firms again caused the Company heavy losses until the agreement for uniform rates was renewed, and Ma Mei-su was removed from the managership. Shen Hsuan-huai then stepped into the vacancy and became Director-general, and from that time (1885) the property began to rise in value. In 1892 the Company bought the godowns at Pootung (Shanghai), and the present offices in

Foochow Road, Shanghai. Until 1904 prosperity was enjoyed by the shareholders, but since then returns have been disappointing. The Shareholders agitated for reforms, but their demands were unheeded until four years ago, when a concession was made in the shape of the appointment of a Board of Directors ostensibly to take the control from the hands of the mandarins and employees. For the first three years the Directorate was one in name only, owing to the dominance of the three officials sent by the Board of Communications at Peking, and they maintained control until last year, when the fall of the Manchu régimé also brought about the fall of their officials. The independent directors, at the instance of Wen Tsung Yao then compelled the officials to resign, nor would they tolerate any other appointees from the government when the provisional Republican Government attempted to follow the practice of the previous Government. rightfully maintaining that the Government had not the least ground upon which to seek representation in a company in which they did not hold one share. Thus this year, for the first time in the history of the Company, the

WEN TSUNG-YAO

Directors appointed by the shareholders, began to have power—and assert it.

The original capital of the company was Tls. 800,000 subscribed by the founders and their friends; it was later increased to Tls. 2,000,000, and owing to the subsequent wave of prosperity. the capital was doubled by the gift to shareholders of two shares for every one share held by them, bringing it nominally to Tls. 4,000,000 -40,000 shares. The largest shareholder was Sheng Hsuan-huai, who held 12,000 out of the 40,000 shares, purchasing most of them during the slump following the Franco-Chinese war. Naturally, he was for a long time a dominant figure in the Company, and when the Board of nine Directors settled down to business three of them at least soon declared themselves, and the Board spilt up into groups. The Chairman was Wu Ting-fang, and he and Wen Tsungyao and Chen Ko-yang, all Cantonese, supported the reform campaign, whilst three Chekiang men, Wang Chung-shan, Sze Tse-ying, and Chao Ching-pao, elected by the influence of Sheng Hsuan-huai were opponents to some measures, Li Shu-yun and Yang Shih-chi,

Anhui men, and Chang Chung-chao, from Chihli, being in a sense neutral. The reformers. however, were determined to do something to put the Company on its feet—for Tls. 680,000 had been lost in 1911, and Tls. 100,000 per month were being lost during this year. They discovered that corruption was rampant and that shareholders were suffering chiefly because the earnings of the Company were being diverted in large measure to the pockets of employees. In all, three proposals were eventually brought forward for consideration. Wen Tsung-yao proposed the first one—to employ a foreign manger and a compradore and reform on the lines adopted by foreign companies urging that since the C.M.S.N. Co. held the best wharfage in the treaty ports and was a Chinese company there must be something radically wrong with the management if they lost money whilst foreign companies gained it. With the proposal Wu Ting-fang and Chen Ko-yang agreed, but the other six opposed it, pleading the extraordinary excuse that sovereign rights would be lost and that anyway, it would be a disgrace for Chinese to have to follow in the footsteps of foreigners after so many years.

Wu Ting-fang in an effort to meet their wishes then made a second proposal that the Company be leased for 10 years to a syndicate of Chinese for Tls. 400,000 per annum, or 10% of the capital value. If during 10 years the lessees



Shêng Hsüan-huai

made money, argued Dr. Wu, they would be willing to put capital into the Company to retain an interest, and with the additional capital the Company could inaugurate a service to Europe, America, and elsewhere. Meantime the lessees would clean out the Augean stables. If, on the other hand, they could not succeed, the business could be wound up. The other six directors still opposed, and the Chekiang men then came forward with the third proposal that the Company should be reorganised by introducing new capital, if necessary, from outside Chinese, the suggestion finding favor with six directors, the three Cantonese being against it.

The opposition to this scheme was due to the certainty in the minds of the opponents that it was a bogus plan devised by Sheng Hsuan-huai to delude shareholders and Directors, and to enable Sheng to gain control of the Company without reforming it in any way. The Cantonese desired the introduction of actual capital to secure a thorough overhaul, but the third scheme was based, not upon the introduction of cash, but a manipulation of the shares. Another ulterior object of this third scheme was to abolish the Board of Directors and establish a Director-General and an Assistant Director-General in its place. The three proposals were, however, placed before shareholders one month before the general meeting which was held on July 14 to consider them. The vote then taken showed that only 47 voted to

reform under European management, 6,655 voted to lease the property, whilst 17,482 voted in favor of reorganisation.

The opposition of the Cantonese to reorganisation was acute and Sheng Hsuan-huai's agents suggested as a means of getting rid of the objectors—that all shares held by Cantonese (a total of 10,000) should be bought in at Tls. 150 each, and to raise part of the necessary amount the Hongkew godowns should be sold to a Japanese firm who was offering Tls.1,400,000. To shareholders from other provinces the proposal was made that for the shares they held they would be given an extra share—or that the script with a face value of Tls. 100 should be destroyed and new scrip with a face value of Tls. 200 issued.

On July 23 a meeting was held in the house of Sheng Hsuan-huai, in Bubbling Well Road, Shanghai, when some of the six directors partial to his plans attended. The whole scheme was discussed, and it was then disclosed that Yang Shih-chi, a friend of Yuan Shih Kai, was to be appointed Director-General in order that the affairs of Sheng, against whom Yuan Shih Kai entertains a bitter grudge, might be made to



Wu Ting-fang

run smoothly. The sub-Directorship was to be given to Wang Chung-shan. Two of the six directors did not, however, see eye to eye with this scheme, and after the meeting visited the Cantonese directors and laid the matter bare, complaining that they wished to join in with the Cantonese since the latter were to get Tls. 150 each for their shares, whilst it looked as if the balance would get nothing, but paper, which would undoubtedly depreciate in value until Sheng could purchase all he wanted in order to obtain complete control. They expressed the wish to co-operate against Sheng, declaring that not only Cantonese, but all shares should be paid for in cash, and thus the opposition to Sheng Hsuan-huai scheme was strengthened.

Following the decision of the meeting of shareholders, however, advertisements were placed in the Chinese press calling for capitalists with Tls. 6,000,000 to reorganise the Company, Liu Hsueh-hsun, a Cantonese, came forward as the representative of a Chinese syndicate and offered payment of the required Tls. 6,000,000, and Tls. 3,500,000 to pay off the Company's

debts, as soon as an agreement could be signed. Sheng's agent, Wang Chin-shan, became alarmed at the appearance of a definite offer of this character, and in order to gain time declared that he could secure Tls. 8,000,000, in addition to the Tls. 3,500,000 to pay off the company's liabilities, from capitalists who were willing to take over the Company. Wang, in reply to a question, said he could not name his capitalist, and, as he was abroad, he could not attend a meeting next day, whereupon Liu claimed that he should have an option since he came forward with a definite offer in reply to the advertisement. As Wang had offered Tls. 8,000,000, plus the amount to pay off the liabilities, he would like a week in which to confer with his syndicate to see if they would increase their offer. The week was granted, and at the expiration of the period Liu expressed the readiness of his financial friends to equal the offer of Wang.

On the same day that Liu appeared with this information Tang Shao-vi's sixth brother, Tang Yen-lu (one time connected with the C. M. S. N. Co's Hongkew wharf) represented Wang with the Tls. 11,500,000 proposal, but his offer was put out of court by the Directors because he said that no present shareholders would be permitted to take up shares in the reorganised company, and because he desired three weeks in which to bring forward the capitalists, whereas Liu declared that his capitalists would welcome shareholders, because they desired to extend the business by inaugurating ocean lines. Liu being the only one left in the running nothing apparently remained to be done but sign an agreement and so conclude the desires of the majority of the shareholders in

To determine upon a proper agreement a committee of three (Wu Ting Fang, Wang Chen Shan, and Chang Chung Chao) was formed from the Directorate to negotiate with Liu, and the meetings were to be held in Wu Ting Fang's house, but before their labors could be concluded an unexpected element in the shape of the employees interjected itself into the question, and brought about a dramatic

anti-climax.

Headed by Messrs. Chen Fei-ting, Tang Fungchih, and Shi Su-shang, the three managers of the Company, the employees commenced a hostile opposition, publishing wild statements in the press against the Directors for selling the Company to foreigners, and particularly defaming the agent Liu in unmeasured terms as a scoundrel and worse. The managers wired to President Yuan Shih-Kai, and members of the Cabinet, raising the alarm that China was to be sold lock, stock, and barrel to foreigners through the agency of Liu, and just as het-foot came back telegrams from the President and others forbidding the sale, though upon what grounds the Government could claim to prevent a private company from doing what it liked with itself was not explained. Mr. Ivan Chen, the Commissioner of Foreign Affairs, was instructed to investigate and prevent the sale, but he quickly found that there was no ground for the allegations of the employees that the Directors were selling out to foreigners.

The newspapers wrathfully declared that an agreement had been signed, and so greatly did the agitators play upon the popular mind that largely attended meetings of people having no interest or concern in the Company were held to instruct the Directors what they should and should not do. Only in China could such a

thing happen.

Two meetings between the committee and Liu had been held when this storm broke loose, and at the third meeting Mr. Wen Tsung Yao attended to personally ascertain just how the negotiations were going. Whilst Liu would not, in response to popular clamor, give out the names of his financial friends, he, at this meeting announced that they were rich Chinese whose names could not be given, since the anger of the populace would at once be directed towards them instead of him, but the capitalists would, he promised, be presented to the Directors before the agreement was signed. As a matter of safeguard, however, Wii Ting Fang proposed that 10% of the purchase price should be paid in, and, if it were found upon signing

the agreement, that foreigners were interested this amount should be forfeited and the negotiations declared off. Not content with that, Wen Tsung Yao urged that the whole sum of Tls. 8,000,000 should be forfeited if foreigners were interested, and Liu ultimately agreed to that.

This was on August 2.

On Sunday August 4, the three managers of the C. M. S. N. Co. (Chen, Tang, and Shih) sent a letter to the Directors inviting them to attend at the Board=room at 5 p.m. next day to hear the claims of the employees to a bonus totalling Tls. 970,000. Wishing to have a further conference with Liu in regard to the conditions of the agreement Directors attended at the office at 3 p.m. About 4 p.m. after Liu left, the question of the bonus raised by the three managers was opened for discussion, and since the proposal was that 10% of the reserve fund (which includes Tls. 4,000,000 capita!) should be deducted to cover a period of 40 years, and be distributed among the employees, the Directors unanimously and unhesitatingly refused, their refusal being accompanied by a statement that not only were the present employees not entitled to such a sum, since they already enjoyed a regular annual bonus, but they had no claim to money which, if it could be distributed as a bonus, partly belonged to employees who were long ago dead or who had severed their connection with the Company. On no grounds, however, would the preposterous demand be entertained, but the Directors did not expect the little scheme of coercion that had carefully been hatched for their benefit in anticipation of this verv attitude.

During the discussion with the managers the door of the room had been locked from the outside, but scarcely had their refusal been definitely understood than it was opened, and about one hundred Chinese rushed into the room and commenced an excited demand for the bonus. The door was closed and guarded; no one was allowed to go out, and the six directors in attendance were at the mercy of a serious-eyed collection of determined men. Scenting trouble, Wen Tsung-yao went to the telephone to call the police, but the general in command of the besieging force, whoever he might have been, had carefully cut the telephone wire, and so the attempt to obtain assistance from the outside was thus far frustrated. The crowd demanded to know why Wen Tsungyao wished to call the police, and, alleging that it was to have them arrested, commenced to attack him. An ink well aimed at his head touched him in passing and tilted its contents over his silk gown, the window was broken, and a general melee seemed imminent, especially as anything but gentle blows were being struck. Director Li Shu-yun deemed discretion to be the better part of valor and escaped by the window, being shortly afterwards followed through the same exit by

Chen.

Four Directors remained to face the crowd, who were now quietening, and as soon as words could be heard the spokesman of the intruders announced that the Directors would have to agree to sign a document approving the bonus asked for before they left the room, and two or three of the employees drew up a document to this effect. They insisted that the Directors should sign. Wu Ting-fang was the first to append his name, and did so declaring that as it was under compulsion it was valueless, and Wang Chung-shan followed, with Chang Chung-chao third.

As this was not a sufficient number to make the document binding upon the rest of the Directors, the spokesmen endeavoured to insist upon Wen Tsung-yao signing. He refused. They threatened, and the more they threatened the more insistent he became in refusing. His fellow-directors beseeched him to sign in order to avert danger, but Wen was obdurate.

"It is shareholders' money they want—and I won't sign that away even if they produce a bomb to kill me," said Wen Tsung-yao quietly. The crowd looked ominous towards 7 p.m., but any violence they might have felt disposed to use was checked by the announcement that police were trying to get in the building—the alarm having been given by a messenger. The

courage of Wen Tsung-yao won the day, for by 7.30 p.m. the employees determined that it would be wiser to withdraw since the police were hammering at the door. Wu Ting-fang, Wang and Chang were allowed to escape first, but the crowd would not let Wen Tsung-yao go until they had expended a little more effort upon him though it proved to be of no avail, Wen Tsung-yao convincing them that if it were right for him to sign he would do so without violence, but no violence would compel him to sign when he knew it was wrong for him to do so.

At once the employees commenced a campaign of vituperation, and in the newspapers charged the Directors with having received Tls. 800,000 bargain money from Liu, and having signed the agreement to hand the Company over to Japanese. Despite the fact that I van Chen's investigations disproved all these allegations, and that the committee appointed by an indignation meeting likewise had all documents disclosed to them, the campaign was still carried on and another indignation meeting was held at the Y.M.C.A. rooms, at which Wu Ting Fang was again forced to sign his name, this time agreeing to head an association to prevent the sale of the Company to foreigners. The Press agents of the opposition announced that the leading political associations were represented in the new association to preserve the Company, and published the statement that Wu Ting Fang admitted the sale and had apologised at the meeting. This of course was an untruth, and was next day repudiated by Wu Ting Fang, whilst the political associations also published advertisements repudiating the statement that they were connected with the new association.

At the second meeting of the association Wu Ting Fang refused to attend, and as a result he was roundly condemned and warmly denounced, Mr. Fu, the auditor of the C. M. S. N. Co., being appointed President in his place. Invitations were sent out to shareholders to register as members of the "Upholding Association"—as the rendering of the Chinese character show it to be-but no more than the holders of 2,000 shares could be collected. The efforts on the part of the various agitators failed to inspire the Board of Directors to resign as a body, though Wu Ting Fang decided to permit the Company to look after itself, so far as he was concerned, and sent in his resignation. He and Wen Tsung-yao had borne the burden of running the early part of the Revolution but they found it easier to turn the Manchus out than reform the C. M. S. N. Co., with which pathetic and significant confession Dr. Wu retired into private life once again.

In the meantime the much abused Liu, under the constant fire of public criticism, and even official condemnation from Peking, disclosed the names of his principals, and showed them to be well-known men of old official rank and some Manchus—and not, as alleged, Japanese.

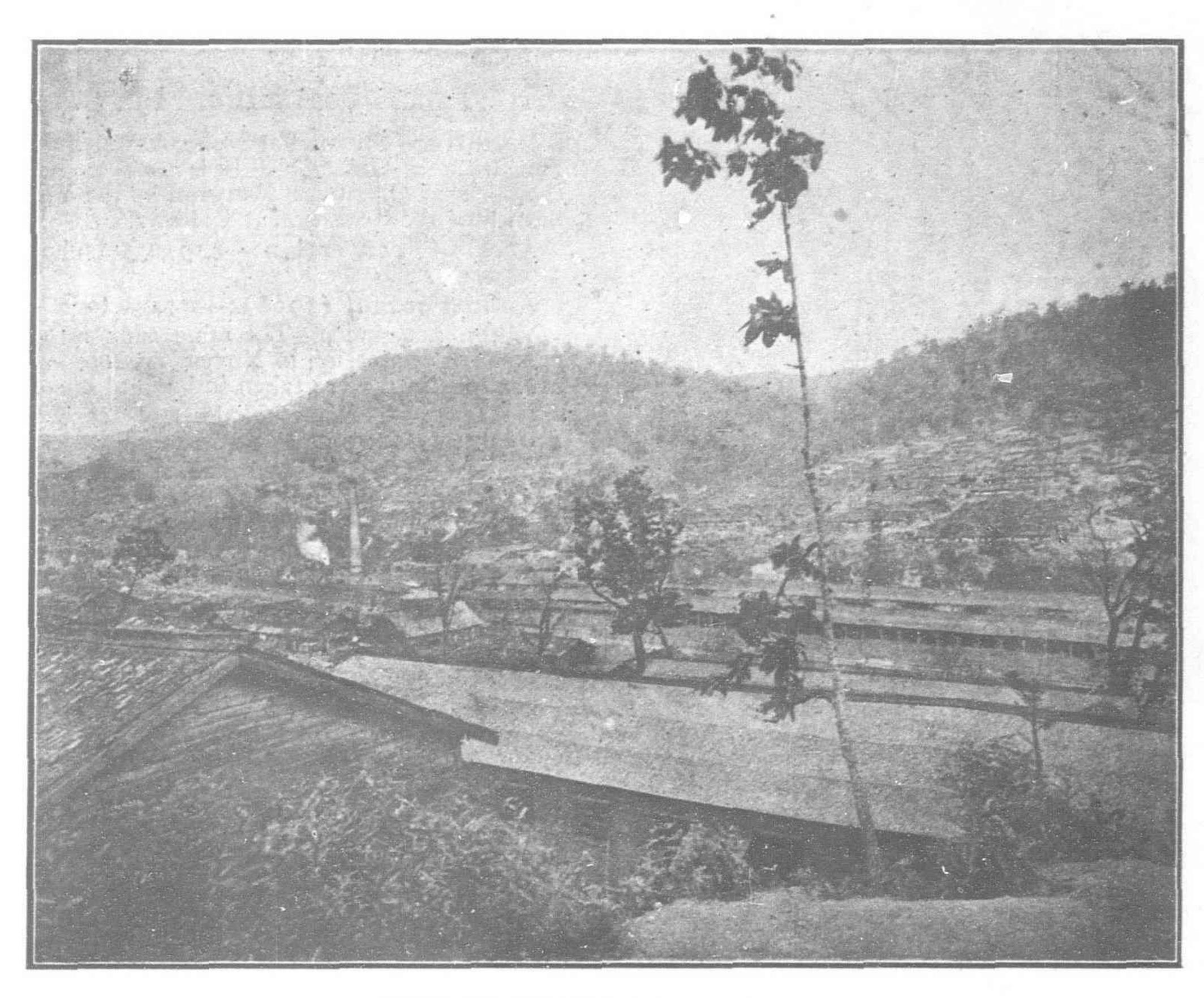
The obstruction raised by the employees consequently collapsed to a great extent, and the prospective "reorganisers" are themselves carrying the matter to Peking, where a delegation has gone on their behalf to argue their case with the Government. Thus the matter stands at present.

It is a strange commentary on the state of company management in China, that employees and disinterested parties are able to prevent Directors carrying out the expressed wishes of shareholders, and be able to obstruct reform so that the corruption they have almost made legal by usage should continue to be possible.

The fleet of the C. M. S. N. Co. at present consists of 31 steamers, with an aggregate of 59,332 tons and 39,700 horse-power. The Company have also a number of tugs and lighters at Tientsin and Kiukiang. At a rough estimate their properties are worth, altogether, fully Tls. 25,000,000—Tls. 13,000,000 being counted as the value of their land, and Tls. 12,000,000 as the value of the steamers. The headquarters of the Company have always been in Shanghai, but there are also wharves and various interests of the Company at Chungking, Ichang, Hankow, Kiukiang, Chekiang, Wuhu, Nanking, Ningpo, Wenchow, Amoy, Swatow, Foochow, Canton, Hongkong, Chefoo, Newchwang and Tientsin.

THE MINES OF THE ORIENT

PROPERTIES OF THE HOKKAIDO TANKO KISEN KABUSHIKI KAISHA (HOKKAIDO COLLIERY AND STEAMSHIP COMPANY)



VIEW OF YUBARI NO. I. MINE

This Company (whose head office is in Muroran, Hokkaido), was established in November, 1889, and was first engaged in the business of coal mining and railway transportation. With the progress of the work of opening up Hokkaido, the demand for its coal increased, and the company extende d its railway and enlarged its colliery works, opening new mines, besides improving its equipments and steadily developing its business. Orginally the company's capital was 6,500,000 yen; but in October, 1906, it was increased to 27,000,000 yen, while it issued debentures to the extent of 10,000,000 yen, which was raised in London. About that time the Imperial Government adopted the policy of nationalising the principal railways of the country, and the company's lines came to be purchased at the price of 30,997,100 yen, which the Government paid in Railway Bonds. Of the company's loan the Government of the same time took over the obligation to the extent of 4,000,000 yen.

The company, then, proceeded with disposing of the bonds, distributing a half of the amount among its shareholders and employing the remaining half in enlarging its colliery works, shipping service, the manufacture of coke and forestry business, together with establishing an iron foundry at the port of Muroran. Further, in conjunction with two of the foremost companies of England, the company opened in the central part of the port a steel works called the Japan Steel Works (Kabushiki Kaisha Nihon Sciko Sho). Thus, in spite of the nationalisation of its railway, the company in no way suffered in its capital, its total shares at present being represented by the sum of 27,000,000 yen of which 4,500,000 is still unpaid. Its outstanding debentures are 6,000,000 yen.

The products of the company's collieries are well known, being among the best coals produced in Japan, Though the annual output does not exceed 1,500,000 tons at present, it is expected that the figure will reach 2,000,000

tons in a few years. The company's forestry and lumber businesses are not many years old yet, but their outputs are already being sent abroad. Its iron and steel works

are still in their initial stages; but the company expects to shortly put on the market the products from their furnaces.

The different lines of business the company is engaged in at present are as follow:—

I. Colliery business.

2. Manufacturing of cokes.

3. Manufacturing of iron, steel and machineries.

4. The company possesses the right to work iron mines and collect iron sands and also dig for other minerals necessary for the production of iron and steel.

5. Electric light business.

o. Manufacturing gas.

7. Forestry and lumber mill business.

8. Shipping business.

A general idea of the nature and conduct of the company's business, may be obtained from a perusal of the following notes:

Yubari Coal Mine. No. 1.

The Yubari Mine, No. 1, 1s situated at Noborikawa, Yubari-gun, Ishikari, Hokkaido, having connections with the ports of Otaru and Muroran, via the branches of the Government Railway. The Manji Mine, situated about four miles to the north of No. 1 Yubari Mine, with coal seams continuous with those of Yubari Mine. It is about 14 miles due east of Shibun station, along the river Horomui.

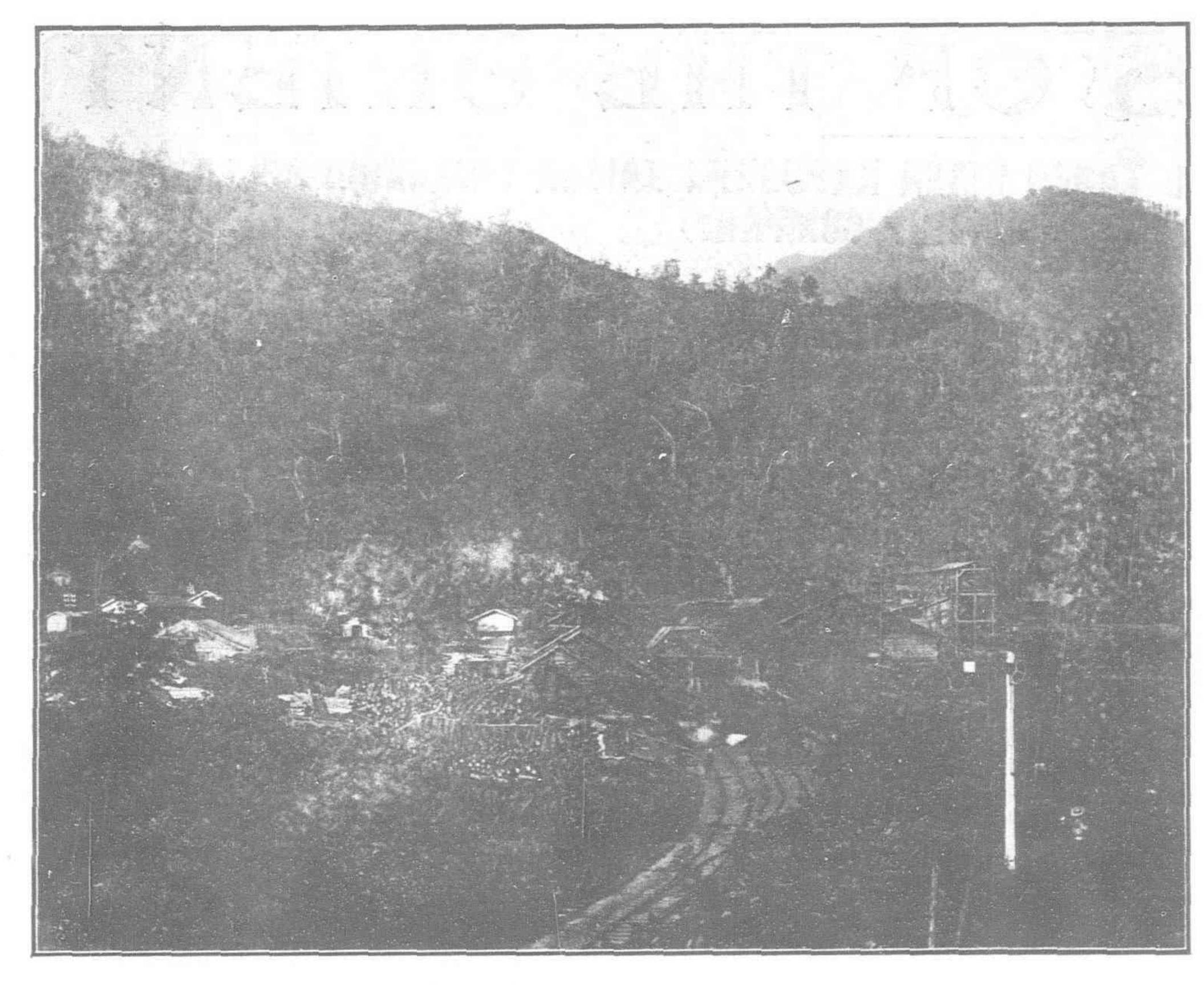
The area of the Concession is 11,212,623

tsubo, or about 9,161 acres.

Annual output (1908):—About 500,000 tons. When discovered:—Yubari Mine No. 1, was discovered 24 years ago, in 1888, and two years later this company obtained official permission to work it, and forthwith commenced operations. Manji Mine originally belonged to Eiji Asabuki, and came into this company's possession in January 20, 1903. The company commenced operations in the mine in November, 1905, and after more preliminary arrangements began to put its production on the market from July, 1909.



VIEW OF YUBARI NO. 2. MINE



VIEW OF IKUSHUMBETSU MINE

Geology:—Tertiary shale and sandstone dipping north-east from 10 to 30 degrees.

Coal seams:—Workable seams are two, at Yubari Mine No. I the upper seam is 24 ft. thick and the lower 4 ft. Both seams are now being worked. At Manji Mine the upper seam is 4 ft. thick and the lower 7 ft. The lower seam alone is being worked for the present.

Quality of coal:—Bituminous caking coal, sp. gr. 1,223, moisture 1,120%, volatile matter 46.588%, fixed carbon 49.585%, ash 2.440%, sulphur 0.267%. When coked, fixed carbon 95.c63%, ash 4.678%. and sulphur 0.259% caking and the colour of ash light brown.

Mining:—Worked by the combination of board and pillar system with long wall retarding in the upper seam. The lower seam is being worked either by the long wall system or by the pillar work system. Besides five entry levels there are at present three slopes of from 1,000 to 2,000 ft. A shaft 18 ft. across and 550

ft. deep is now being bored. Haulage: - Each working face has self-acting inclined plane to lower the coal to main roadway, Underground haulage is done by manual labour, horse and pneumatic locomotives. The locomotive has a pair of cyclinders 6 ins. dia., by 10 ins. stroke and is driven by 800 lbs. per sq. in., compressed air. It has an air-reservoir of 68 cu. ft. capacity. The coal at Manji Mine is transported to No. 1 Yubari Mine by the patent "Tamamura" system, double ropeway. The particulars are as follows:-Length: 6,500 metres; Difference between the levels of the terminals: 91 metres; Difference between the hightest and lowest points in the line: 443 metres; Carrying capacity per ten hour day: ascending load 500 tons coal, descending load 100 tons timber; Maximum weight or size of freight unit: coal 5/8 ton, timber 3 metres when two cars are coupled timbers 20 metres long may be carried; Distance between consecutive cars: 82 metres; Speed: 109 metres per minute; Motive power required: 200 horsepower (electricity); Size of ropes:—Track rope 41.5 mm. dia. at loaded line, 35 mm. dia. at empty line, and hauling rope 28 mm. dia.; Number of supports: 51; Maximum span between supports: 337 metres.

Winding:-Three winding engines placed one each above the mouths of slopes: One endless rope hauling machinery driven by steam engine of 200 H.P,; One endless rope hauling machinery driven by induction motor of 135

H.P.; One steam direct hauling engine of 300

Pumping:—Eight pumps placed in the first and second slopes, six Cornish double acting ram pumps placed at No. 1 slope of which three are a spare. Their st. cyl. each 18 ins. dia., plunger 12 ins. dia., each 24 ins. str., driven by 80 lbs, per sq. in. compressed air. At No. 2 slope, two Knowle's special duplex plunger pumps placed, one of them as a spare. Their st. cyl. 16 ins. dia., plunger 7 ins. dia., each 12 ins. str., driven by 60 lbs. per sq. in. compressed air.

Ventilation:-The mines being very fiery, two 20 ft. Guibal's fans and ten Champion's fans of from 4 to 8 ft. are used. The Champion's fans are driven by induction motors from 10 to 50 H.P.

Lighting:—The Wolf's naphtha safety lamps of German make are generally used.

Coal dressing: -- Either manual or mechanical work. The former, the coal is classified into two kinds the lump and the small, then from the lump, slates and dirt are picked out by women. The latter, the coal is classified by the shaking screens with perforated plates, from the lumps, slates and dirt are picked out by women while they are travelling on the picking band, and the small is washed by "Elliot" and "Blacket" washers and jiggers.

Transportation at surface: The mines are connected with the shipping ports of Otaru and Muroran by the Government Railway.

Number of workmen: - Underground 3,161;

Surface 2,382; Total 5,543.

Motive power: -- Steam; fourteen 24 ft. long by 6 ft. 6 ins. dia., Lancashire boilers, working pressure 80 lbs., and six 200 commercial H.P. Heine safety boilers, working pressure 125 lbs Compressed air. One duplex high pressure Corliss valve piston inlet air compressor of 20 ins. st. cyl, and 22-1/4 ins. air cyl. with 42 ins. stroke has a capacity of 2,718 cu. ft. of free air per min. raised to 80 lbs. press; Two air compressors of the same pattern of 24 ins. st. cyl. and 24-1/4 ins. air cyl. with 42 ins. stoke, each having a capacity of 3,211 cu. ft. of free air per min. raised to 80 lbs. press. One three stage air compressor of st. cyl. 22 ins. dia. by 30 ins. stroke, intake air cyl. 18 ins. dia. by 30 ins. stroke, intermediate air cyl. 18 ins. dia. by 30 ins. stroke and high pressure air cyl. 5 ins. dia. by 30 ins. stroke, has a capacity 560 cu. ft. of free air per min. raised to 800 lbs. press.

Electricity:--Three 300 K.W. 550 volts, 3-phases 50 cycles engine type generators, driven by 15" × 32" × 30" horizontal cross compound side crank condensing engines. These generators are usually run in parallel.

Exportation to foreign countries:-Amounts of exportation and their destinations during 1908 as follows:-Hongkong, tons 12,190; Vladivostock, tons 1,000; Singapore, tons 24,800; Savan, tons 9,510; Java, tons 3,696; Total, tons 51,276.

Yubari Coal Mine. No. 2.

Locality: Situated at Noborikawa, Yubarigun, Ishikari, Hokkaido. It is connected with the ports of Otaru and Muroran by the Yubari branch of the Government Railway.

Area of concession: -- 4,101,253 tsubo or 3,424 acres.

Annual output (1908):-117,650 tons.

When acquired:- The mine came into the company's possession in November, 1905, when operations in it were taken in hand at once.

Geology:-Tertiary shale and sandstone dipping east, from 20 to 70 degrees.

Coal seams:- Eight workable seams of from 4 ft. to 10 ft. No. 1 seam, is, however, about 60 ft. thick.

Quality of coal:-Bituminous caking coal, sp. gr. I.227, moisture I.590%, volatile matter. 43.575%, fixed carbon 53.535%, ash 1.110%, sulphur 0.190%. When coked, fixed carbon 97.768%, ash 2.027%, sulphur 0.205%, caking and ashy in colour.

Mining:-Worked by pillar working system along slopes of from 14 ft. to 18 ft. broad. At present there are eight levels and two slopes.

Haulage: - Each working face has self-acting inclined plane to lower the coal to main roadway. Underground haulage is done by manual labour or by horse. The coal taken at Mayachi mine is transported to Kayede Mine by the patent "Tamamura" system double ropeway. The particulars are as follow: -- Length: -- 4,550 metres; Difference between the levels of the terminals:-50 metres: Difference between the highest and lowest points in the line:-218 metres; Carrying capacity per ten hour day:-Coal 500 tons descending loads, timber 100 tons ascending loads; Maximum weight or size of freight units:-Coal 5/8 ton, timber 3 metres in length. When two cars are used 20 metres or more allowed; Distance between consecutive cars:-82 metres; Speed:-109 metres per minute; Motive power:-100 H.P.; Size of ropes:-Track rope 41 mm. dia. at loaded line, 35 mm. dia. at empty line, and hauling rope 25 mm. dia.; Number of supports:-33; Maximum span between the supports:-647 metres.

Winding: - Four winding engines placed one each above the mouths of slopes, driven by induction motor of 50 H.P.

Pumps:—Only one Worthington sinking pump is employed, the water in the levels being scarce. Its st. cyl. 16 ins. dia., plunger 8 ins. dia. hy 16 ins. str., driven by steam of 80 lbs. per sq. in.

Ventilation:- The mine being very fiery, many fans are being used, namely five Champion's fans of 4 ft. dia., all driven by induction motor of 10 H.P.

Lighting: -- The Wolf's naphtha safety lamps of German make are generally used.

Coal dressing:-Manual work is generally in use at present, though preparations are now in progress to introduce the employment of engine work for the future.

Transportation:--The mine is connected with the ports of Otaru and Muroran by the Government Railway.

Number of workmen: - Underground 604; Surface 795; Total 1,399.

Motive power:--Steam; four 300 commercial H.P. Heine safety boilers, working pressure 150 lbs.

Electricity: Two 500 K.W. 3,300 volts. 3-phases 50 cycles, turbo-generators, and two 750 H.P. Westinghouse Parson's steam turbines, all in parallel running.

Exportation to foreign countries:—None at present.

Sorachi Coal Mine.

Locality.-Situated at Utashinai, Sorachi-gun, Ishikari, Hokkaido.

Area of concession: -6,920,444 tsubo or 5,654 acres.

Annual output (1908):-249,356 tons.

When discovered:-The mine was discovered in 1854 and the company obtained concession in 1889. The operations were commenced in 1891.

Geology:--Tertiary shale and sandstone. The district is inconceivably disturbed, and the dip is from 5° to 80°.

Coal seams:-Over ten workable seams of

from 2 ft. 6 ins. to 9 ft.

Quality of coal:-Bituminous caking coal; sp. gr. 1,267, moisture 0.890%, volatile matter 32.368%, fixed carbon 59.826%, ash 6.740%, sulphur 0.176%. When coked, fixed carbon 89.775%, ash 10.114%, sulphur 0.111%, caking, ashv.

Mining:—The long wall system where the dip is slow, and overhand stoping as in metalliferous mines, when the dip is steep.

Haulage:—Manual labour and horses for the underground haulage, and manual labour, electric locomotive and tramway for the surface haulage to connect the pit mouths with the screening house. Five electric locomotives of the make of Westinghouse Electric Co. are driven each by two 8 H.P. direct current motors. There are two tramways, one connecting Nishiyama level and the other Kamoi level with Kamoi screening house. In each case it is patent "Tamamura" system single ropeway of which the particulars are as follows:—

Length Nishiyama tramway, 2,182 metres, Kamoi tramway, 303 metres; Difference between the levels of the terminals Nishiyama tramway, 92 metres, Kamoi tramway, 5 metres; Difference between the highest and lowest points in the line Nishiyama tramway, 242 metres, Kamoi tramway, 5 metres; Carrying capacity per ten hour day: Coal, ascending lead Nishiyama tramway, 500 tons, Kamoi tramway, 500, tons; Timber, descending load Nishiyama tramway, 100 tons, Kamoi tramway, 100 tons; Maximum weight or size of freight units: Coal Nishiyama tramway, 500 lbs., Kamoi tramway 560 lbs.; Timber Nishiyama tramway, 3 metres, Kamoi traniway, 3 metres; Distance between consecutive cars Nishiyama tramway, 36 metres, Kamoi tramway, 36 metres; Speed Nishiyama tramway, 121 metres, Kamoi tramway, 121 metres; Motive power Nishiyama tramway, 35 H.P. Kamoi tramway, 15 H.P.; Size of rope Nishiyama tramway, 25 mm. dia., Kamoi tramway, 25 mm. dia.: Number of supports Nishiyama tramway, 32, Kamoi tramway, 3; Maximum span between the supports Nishiyama tramway, 132.73 metres, Kamoi tramway, 119 metres.

Winding: - Two direct hauling engines are in use, one of 300 H.P. steam engine and the

other of 320 H.P. induction motor.

Pumping:—Two methods in use: natural drainage and pumping. In the former case the water is naturally drained out of the shaft by a ditch dug along the level. In the latter case steam or electric power is used, eight pumps being in operation at present, the particulars are:---

Steam pumping, three Worthington's plunger pumps of which one is a spare. Each has st. cyl. 22 ins. dia. by 18 ins. str. with 7 ins. dia. plunger, driven by steam of 80 lbs. per sq. in.

Electric pumping, one triplex plunger pump, 8 ins. str. with 6:5 ins. dia., driven by direct

current motor.

Ventilation:-The mine is very fiery and many fans are used as follows:-One 35 ft. Waddle fan, driven by steam engine, 20 ins. cyl. dia. with 30 ins. str. One 20 ft. Guibal fan, driven by steam engine, 20 ins. cyl. dia. with 24 ins. str. Eight Champion's fans of from 4 ft. to 8 ft. driven by direct current motor, or induction motor of from 10 H.P. to 50 H.P.

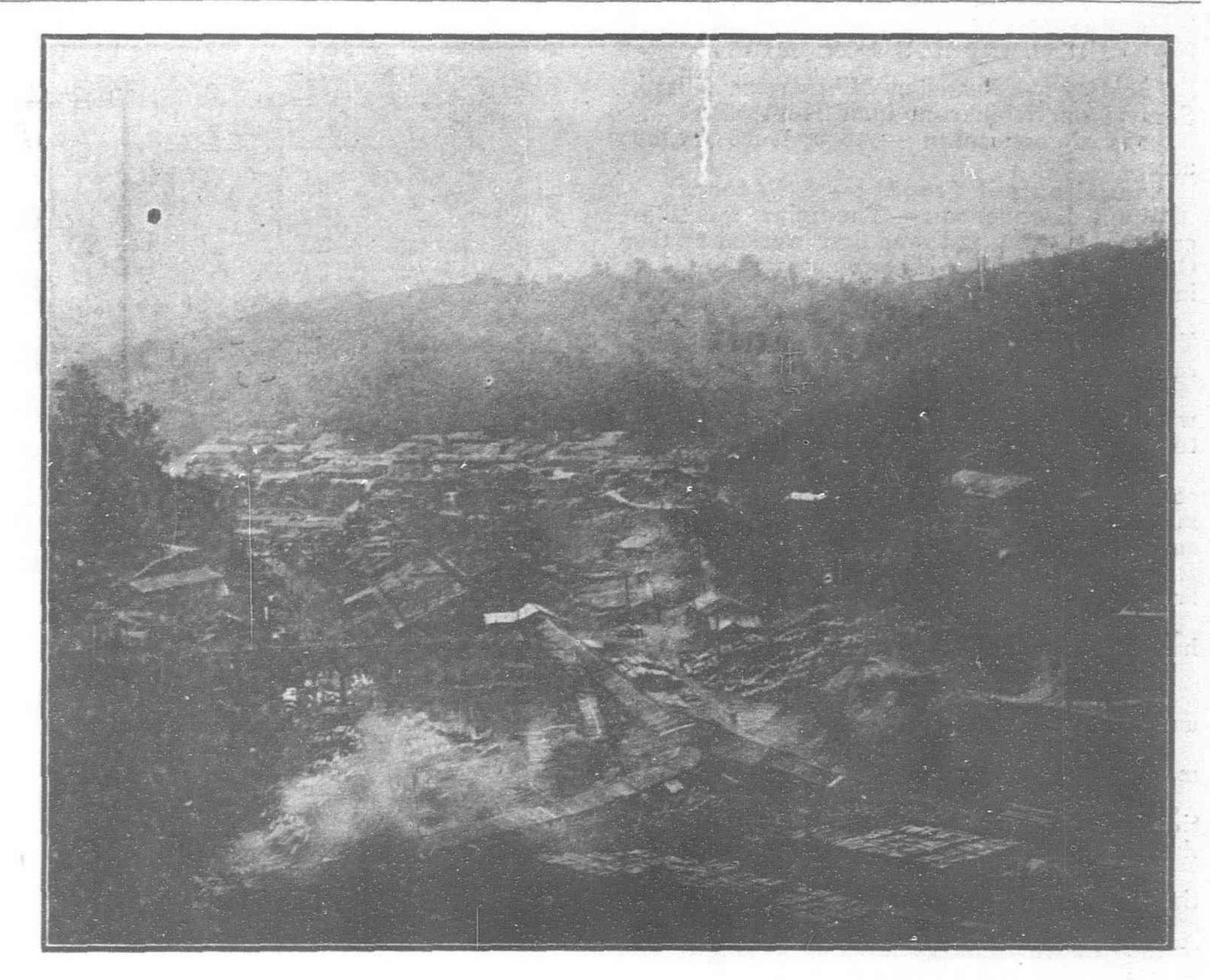
Lighting:—None but the safety lamps in use

all over the mine.

Coal dressing:—The work is done both by hand and engine, similar to the method in use

at Yubari Mine No. 1.

Transportation: The mines are connected with the ports of Otaru and Muroran by the Government Railways, the loads being taken in at Utashinai and Kamoi stations.



VIEW OF PORONAI MINE

Number of workmen:—Underground 1,004; Surface 1,076; Total 2,080.

Motive power:-Steam: Nine 24 ft. long by 6 ft. 6 ins. dia., Lancashire boiler, working pressure 80 lbs., two Babcock and Wilcock boilers with the same working pressure, and four 120 lbs. pressure Heine safety boilers. Compressed air:-One straight line pattern piston inlet air compressor, st. cyl. 24 ins. dia., air cyl. 24-1/4 ins. dia. by 30 ins. stroke, has a capacity of 1,225 cu. ft. free air per min., raised to 80 lbs.

Electricity:-Three 60 K.W. 550 volts direct current 4 poles, 1,040 R.P.M., compound wound generators, driven by 3 horizontal single cyl. 13"X12" noncondensing engines, and two 150 K.W. 3,300 volts, 3-phases 50 cycles engine type generators, driven by two horizontal double cylinder 18" x 29" x 19" noncondensing engines, both being worked in parallel. Two 500 K.W. 3,300 volts, 3-phases 50 cycles turbo generators plant will shortly be installed.

Foreign exportation:—None at present.

Poronai Coal Mine.

Locality:—Situated at Mikasayama, Sorachigun, Ishikari, Hokkaido.

Area of concession: -862,273 tsubo or 704 acres.

Annual output (1908):-190,074 tons. When discovered:—The mine was discovered in 1868, and was first worked by the Government, It came into the company's possession in 1889.

Geology:-Tertiary shale and sandstone, and coal measure forms a big anticlinal whose axis extends about 12,000 ft. from north-east to south-west with a dip of from 18 to 70 degrees.

Coal seams: Four workable coal seams of from 3 ft. to 5 ft. 6 ins.

Quality of coal:—Bituminous non-caking coal; sp. gr. 1.262, moisture 3.835%, volatile matter 44.175%, fixed carbon 48.817%, ash 2.960%, sulphur 0.213%. When coked, fixed carbon 94.086, ash 5.705%, sulphur 0.209%, noncaking and ashy.

Mining:-Either the longwall system or the overhand stoping similar to that which is in use in metalliferous mines is adopted according to the moderateness or steepness of the dip.

Haulage:—The coal is lowered to the main roadway either by the self-acting inclined plane or by shoot, or hauled up to the principal

roadway by the hauling engine, whence to be conveyed by manual labour, horses, or endless rope haulage to the screening house.

Winding:-One direct winding engine of 300 H.P. is placed at Takinosawa shaft.

Pumping:-Four Knowle's special duplex steam pumps, whose st. cyl. 16 ins. dia. and water cyl. 7 ins. dia. by 12 ins. str. driven by steam of 80 lbs. press. per sq. in. Besides these there are two Deans vertical sinking pumps, whose st. cyl. 10 ins. dia. and water cyl. 5 ins. dia. with 16 ins. str., driven by compressed air of 80 lbs. per sq, ins.

Ventilation:—The mine being very fiery, fans are worked as follows: one 18 ft. Guibal's fan, driven by steam engine, whose st. cyl. is 16 ins. dia. by 24 ins. str. and five Champion's fans of from 6 ft. to 8 ft. each driven by induction motor of from 20 H.P. to 60 H.P.

Lighting:—The Wolf's naphtha safety lamps of German make are generally used.

Coal dressing:-Screening is principally used, and washing is done by jigging machines and troughs.

Transportation:—The mine has connection with the ports of Muroran and Otaru by the Government Railway.

Number of workmen:-Underground 1,100 Surface 638. Total 1,747.

Motive power:-Steam: One 16 ft long by 5 ft. dia. Cornish boiler working pressure 80 lbs. Two 20 ft. long, by 5 ft. 6 ins. dia., Lancashire boilers working pressure 80 lbs. Six 24 ft. long, by 6 ft. 6 ins. dia., Lancashire boilers working pressure 80 lbs. Two 27 ft. long, by 6 ft. 6 ins. dia., Lancashire boilers working pressure 80 lbs.

Compressed air: One straight line pattern piston inlet air compressor, st. cyl. 24 ins. dia., air cyl. 24-1/4 ins dia., by 30 ins. str., has a capacity of 1,225 cu. ft. free air per min. raised to 80 lbs. pressure.

Electricity:-Two belt driven, 3-phases, delta connected revolving field alternators, 185 K.W. 550 volts, 194 amperes, 50 cylces, one of them driven by horizontal tandem compound condensing engine, high pressure cylinder 14 ins. dia. low pressure cylinder 25 ins. dia. by 18 ins. str., and the other horizontal single cyl. noncondensing engine, st. cyl. 22 ins. dia., by 20 ins. str.

Foreign exportation:—None at present.

Ikushunbetsu Coal Mine.

Locality :- Situated at Mikasayama village, Sorachi-gun, Ishikari-no-kuni, Hokkaido.

Area of concession :- 718.227 tsubo or 1,578 acres.

Annual output (1908):-78,081 tons. When discovered: - The mine was discovered in 1880 and was first worked by the Government in 1885. The company acquired it in 1889.

Geology: -- Tertiary shale and sandstone. The measure strikes north and south dipping east with the average inclination of 70 degrees.

Coal seams :- Four workable seams of coal within 400 ft. The thickness varies from 3 ft.

Quality of coal :- Bituminous non-caking coal, sp. gr. 1.242, moisture 2.070%, volatile matter 49.242%, carbon 44.463%, ash 4.090%, sulphur 0.135%. When coked, carbon 91.432%, ash 8.410%, sulphur 0.188%, non-caking, light brown.

Mining:-The coal getting is done by overhand stoping.

Haulage :- Manual labour and horses, Lighting: - The safety lamps are exclusively

Coal dressing :- Screening is all done by

manual labour. Transportation :- The mine has connection with the ports of Otaru and Muroran by

the Government Railway. Number of workmen,-Underground 423, Surface 303, Total 726.

Pumping and winding:-The mine being worked above drainage level, at present, there is no pumping and winding engines.

Ventilation :- The mine not being fiery, only one 6 ft. Champion's fan driven by steam engine, st. cyl. 7 ft. by 10 ins. str.

Foreign exportation :- None at present.

Cokes.

OIWAKE COKE OVENS.

Locality :- Near Oiwake railway station on the Government Railway, and about 62 miles from the port Muroran,

Area of the ground owned by the company: -34 acres.

Annual production (1908): -8,800 tons. History: - The plant was opened to work

by the company in 1901. Coals used in coke making :-- Coals are supplied from the Sorachi and Yubari coal

Coke ovens :- Fifty Coppee pattern ovens, at present.

mines.

Washing: -- Washing plant consist of four feldspar jiggers, two disintergrators, and five

bucket elevators. Motive power: Boilers: two 24 ft. 3 ins, long by 6 ft. 3 ins. dia. Cornish boilers working pressure 80 lbs. Steam engines : One horizontal single cylinder non-condensing engine st. cyl. 14-1/2 ins. dia. with 26 ins. stroke, and one vertical single cylinder non-condensing engine st. cyl. 13 ins, dia. with 24 ins. stroke, one steam driven coke pushing engine with one vertical boiler mounted on the same carriage.

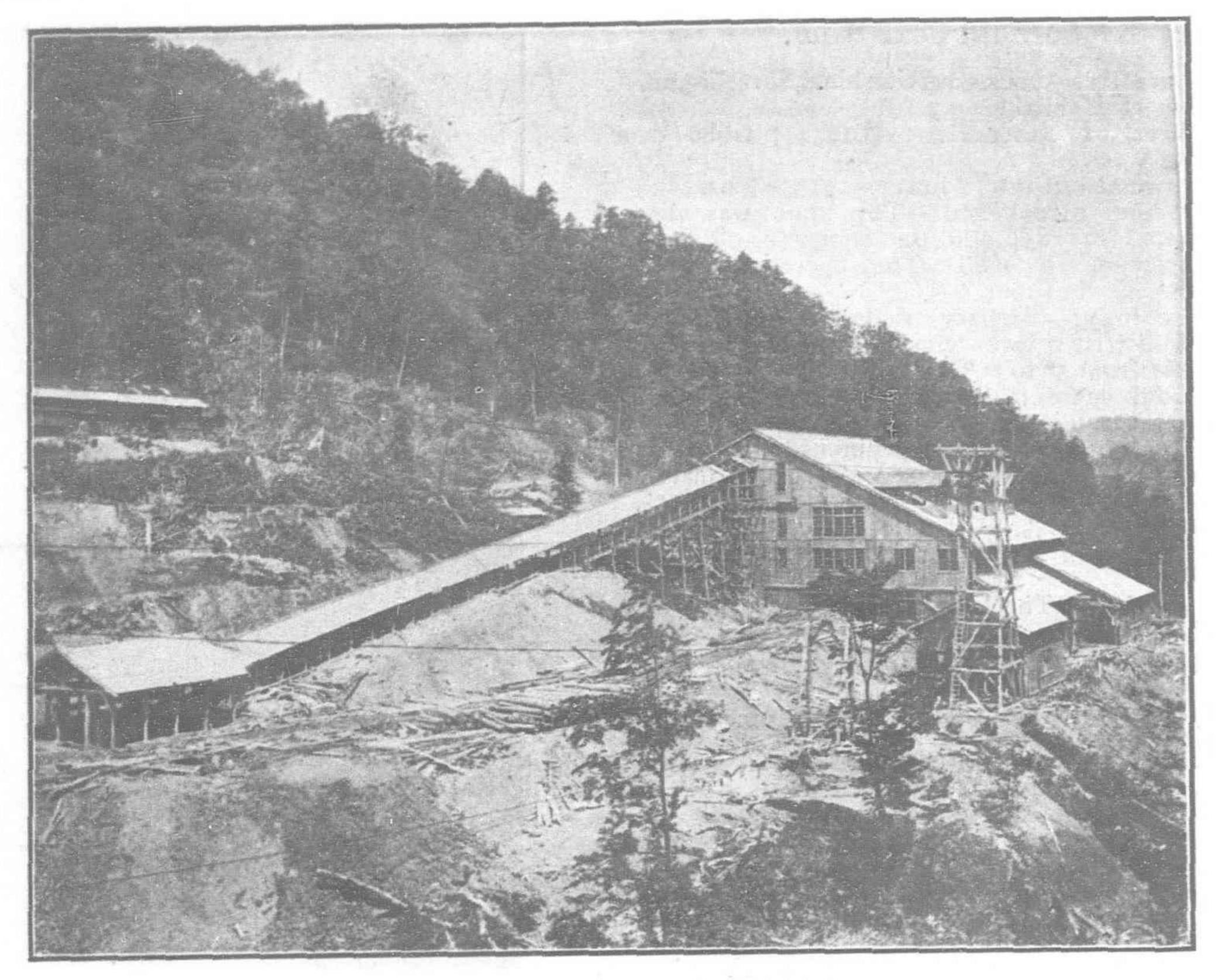
Coke making :- Four to five tons of coal each oven are the usual charge and the yield of coke is from 60% to 70% after 48 hours firing.

Quality of coke: - Specific gravity 1.63, Moisture 0.71%. Volatile matter 1.01%, Fixed carbon 86.60%, Ash 11.58%, Sulphur 0.07%. Number of workmen :- Altogether 153.

Iron Sand. (bricket.)

Occurrence of Iron Sand :-- Volcano Bay Coasts, Hokkaido,

Annual production ;-- About 20,000 tons. Manufacture of Iron Sand Bricket :-Iron Sand containing in average 60% of iron is gathered, and then roasted in a reverberatory furnace. Being next removed into a mixing machine with sauce combining chemicals, the ingredient is treated with water and steam for about an hour. It is then pressed into a fixed sized bricket. The bricket is put in a retort and subjected to steam pressure of about 7 atm. for 8 hours. Then the solidified bricket is smelted in the blast furnace together with other iron and manganese ores.



SCREENING MACHINE AND AERIAL TRAMWAY AT MANJI MINE

Iron Sand Bricketing plant:—The bricketing processes are all mechanical the following principal machines being used for the purpose :-- I Ball Mill with double screens; I Roll Mill with double screens; I Mixing machine with steam jacket; I Bricket-press with automatic feeder; 2 Steam retorts (2 M. by 16.5 M.) driven by 165 K.W. electric power.

Wanishi Iron Work.

Locality: Situated to the north east of Wanishi Village, Muroran District, Iburi Province, Hokkaiko. It is three miles from Muroran and faces the Muroran Bay.

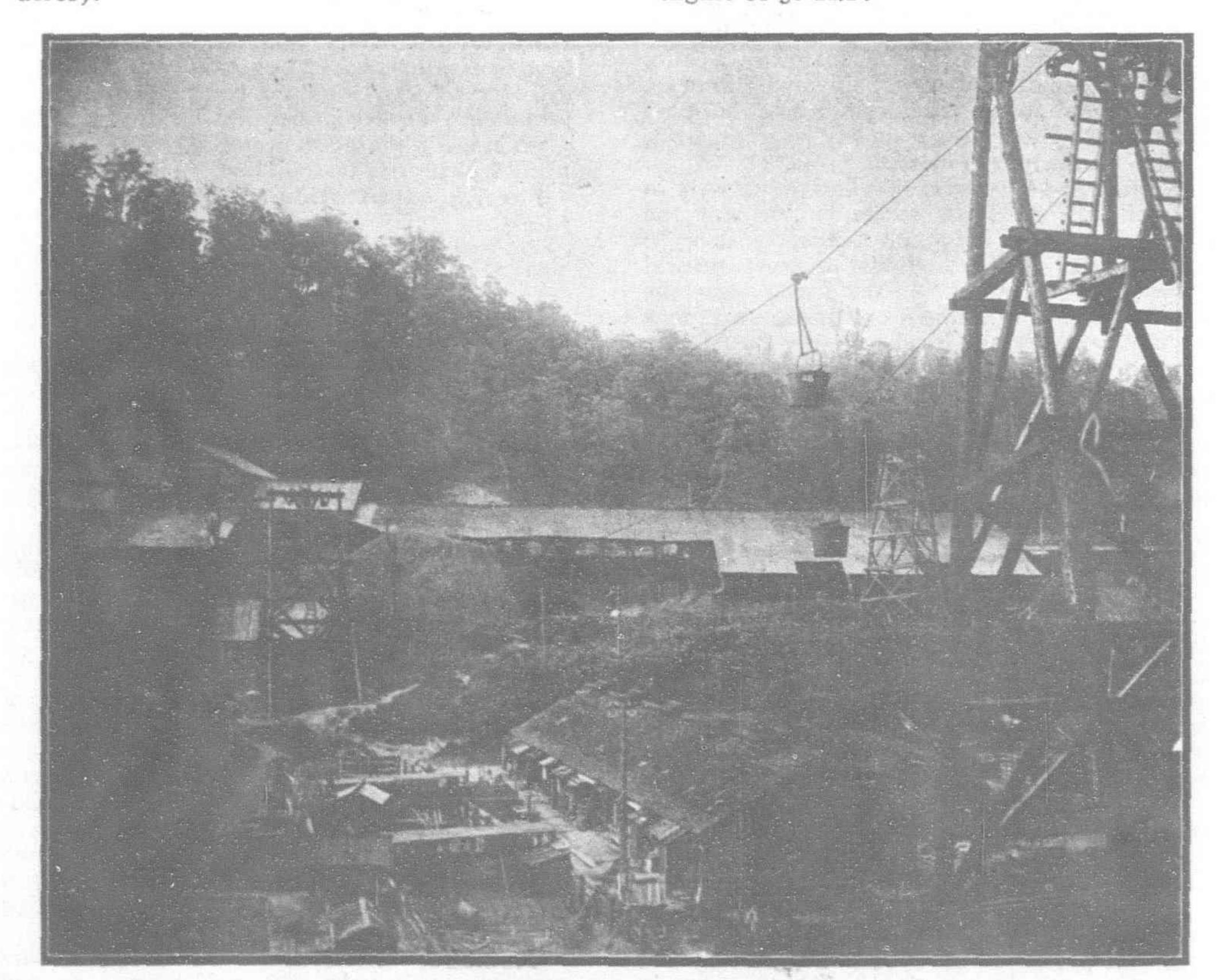
Area of Ground: -- About 50,000 tsubo (40 acres).

Annual production :- About 20,000 tons. History: The Works were started in July Meiji 42 (1909).

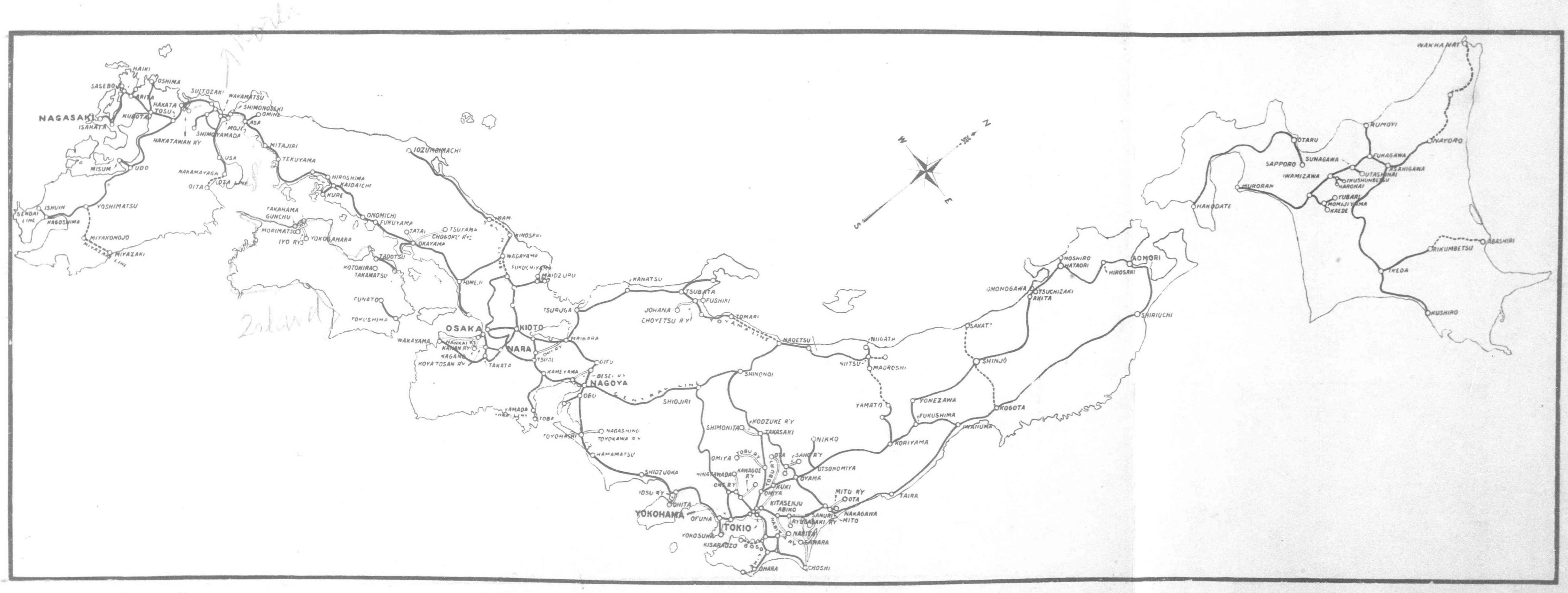
Smelting materials:-The Works draw the principal part of their supply of smelting materials from iron sand found in the coast of Volcano Bay, Hokkaido, supplemented by iron and manganese ores from several parts of the Empire.

Blast Furnace:—One blast furnace about 24 M. high and 200 cubic M. of inside volume, producing about 50 tons pig fron per day,

Winding hoist:—The total height of hoist 28.5 M., iron construction, driven by electric engine of 50 H.P.



SCREENING MACHINE AND AERIAL TRAMWAY AT SORACHI MINE



Government Lines

... under construction

Private Lines

RAILWAYS OF JAPAN

Gas purifier: - Four vertical pipes of 1.5 M. diam, each connected to one another and with inside water spray.

Hot blast stoves:-Three Cowper stoves 21.5 M. high by 5.6 M. inside diam. each.

Power and Engine plant:—Boilers—five 200 H.P, Lancashire boilers, made to use either coal or waste gases from blast furnace.

Electric Generator:-One 250 K.W. 550 volts 3-phase Westinghouse alternate current generator, directly connected to McIntosh and Seymour horizontal tandem engine.

Blowing Engine:-One horizontal compound condensing engine of about 500 H.P., the eapacity of 300 cb. M. of cold air per minute against a pressure of 0.6 atom., made by Cockerill Co., Belgium.

Manufacture of Pig Iron: - Iron sand bricket and iron ores are together smelted in the blast furnace, making about 50 tons of pig iron per day. Principal products are foundry and Martin Pigs, Spiegeleisen and ferromanganese, mainly used as materials of steel manufacture at the Japan Steel Works Ltd. The by-products are slag wool and bricks.

Number of workmen: -Altogether 310.

THE RAILWAYS OF JAPAN

In order to unify the arrangements of transportation in Japan and promote its economic advantages, the Government, according to the Railway Nationalisation Law, issued in March, 1906, purchased the lines belonging to seventeen Railway Companies, namely the Kōbu, Hokkaidō-Tankō, Ganyetsu, Nippon, Nishinari, Sanyō, Kyūshū, Hokkaidō, Kyöto, Hankaku, Hokuyetsu, Söbu, Boso, Nanao, Tokushima, Kwansai, and Sangū. Their aggregate mileage on the day of purchase was 2,823 miles, and the total amount of loan bonds delivered to the private railway companies as purchaseprice was yen 476,318,800 (£ 48,788,159), which was completely paid on the last day of July, 1909.

The working of the Japanese Railways during the year 1910-11 according to the "Twelfth Financial and Economic annual," 1912, gave

the following results:-

Of the aggregate working mileage, 4,870 miles were represented by the State lines, 484 miles by the private lines, and 706 miles (618 miles of broad gauge and 88 miles of narrow gauge) by the South Manchuria Railway Company's lines, making a total of 6,060 miles. The number of passengers totalled 166,888,048, and freight tonnage 31,718,399 tons, while the traffic receipts amounted to yen 109,481,513 (£ 11,213,921), in which yen 52,783,202 (£ 5,406,453), represented coaching receipts, yen 54,228,136 (£ 5,554,454) freight car receipts and yen 2,470,175 (£ 253,014) miscellaneous receipts.

On the State lines, average working mileage for passenger was 4,815.9 miles and for goods traffic 4,764.2 miles. The number of passengers was 138,629,706 and goods amounted to 25,481,868 tons. Traffic receipts were:passenger yen 46,483,237 (£4,761,163); goods yen 41,408,438 (£ 4,251,607); sundry yen 1,344,917 (t 137,757); total yen 89,336,592 (9,150,527). The working expenses, interest on loans, etc., amounted to yen 76,509,849 (£ 7,836,715) and the net profit, deducting the said items of expenses from the receipts, came to yen 12,826,743 (£1,313,812.) The estimated receipts and expenses of the Imperial Government Railways for the financial year 1912-13 are, receipts yen 100,002,658 (£ 10,252,244) and expenses yen 89,485,107 (£ 9,165,739), giving a net profit of yen 10,607,551 (£ 1,086,505): in these expenses is included yen 34,364,226 (£3,519,843), the interest on the public loans for the purchased railways, etc.

The law relating to Light Railways was issued in April, 1910, and put into force in August of that year. The construction of light railways was formerly subject to various inconveniences, as it was practically regulated by the ordinary railway or the tramway regulations. It was to obviate this difficulty that the special measure was adopted. This legislative measure guarantees the profit of private light railways within the limit of 5 per

cent. of the construction expenses. It is expected that owing to this encouragement, light lines representing a cost of construction of yen 10,000,000 (£ 1,024,275) will be laid every year.

The private and light railways existing at the end of the year 1910-11, including those for which charters were newly issued, numbered 59, with an aggregate capital of yen 79,051,000 (£ 8,096,999), of which 22 companies had their lines open to traffic. They carried during the year 25,009,254 passengers and 2,314,367 tons of goods, while the traffic receipts and expenses were yen 4,473,317 (£458,191) and yen 2,143,316 (£ 219,535) respectively, leaving a balance of yen 2,330,001 (£ 238,656) as profit. The cost of construction of open lines amounted to yen 32,109,409 (£ 3,288,888).

The report of the Japanese State railway business for the last half-year makes a very satisfactory showing. The total receipts during the six months ending June 30, 1912, reached 52,085,693 yen, the figures covering the passenger fares and freight revenue. This is an increase of about 9 per cent. over the 4,201,984 yen of the first half-year of 1911. The monthly report of the receipts is as follows:-

receipts Running per mile Receipts Mileage per day. Yen Total52,085,693

As will be seen from the above table the receipts continued to increase during the first four months, the daily receipts per mile increasing from 48 yen in January to 68 yen in April. Since May the receipts have been on the decline the figures for June falling to 52 yen, which, however, is an increase of about 4 yen compared with the 48 yen of January.

Classified into passenger and freight receipts,

the figures are as follow:

PASSENGER FARES

No. of passengers	Receipts	Average receipts per day per mile. Yen
January11,552,481	3,689,410	23,689
February 10,612,272	3,616,341	24,816
March	4,993,259	31,984
April	6,001,400	37,575
May	4,938,598	31,515
June10,890,133	3,782,433	26,902
Total78,621,930	27,021,531	

EDRICHTACE RECEIPTS

I KEI	GHIAGE RECE	APTS	
	Quantity of freight	Freightage receipts. I	Average receipts per day per mile.
January			
February			
March			
April	2,618,429	4,409,843	29,579
May	2,711,860	4,435,503	28,305
June	2,543,702	4,172,304	27,469
Total	15,367,111	25,064,162	

The total number of passengers on all lines during the half-year was over 78,000,000, and the freight was over 15,000,000 tons. The receipts therefrom amounted to over 27,000,000 and 25,000,000 yen respectively. Compared with the corresponding period of last year, the figures show an increase of over 5,800,000 in the number of passengers and over 1,700,000 tons in the volume of freight, netting an increase of over 1,400,000 and 2,700,000 yen respectively in receipts.

What is to be noticed is the conspicuous increase in the freight receipts, which is at a much greater rate than passenger receipts. This is gratifying, as indicating that the State railway is gradually evolving from a passenger to a freight standard.

The first line constructed in Japan was the Tokyo - Yokohama section. The work was started in 1870 and the section was opened in 1872. This was followed by the Osaka-Kobe section, which was opened in 1874. The progress of construction since that time may be inferred from the following quinquennial figures covering up to the end of the year 1910.

	Govern- ment.	Private.	Total.
	m.	m.	m.
1872	18.0	0	18,0
1875	38.0	0	38.3
1880	98.3	0	98.3
1885		134.7	358.5
1890	550.6	848.6	1,399.2
1895	593-3	1,697.2	2,200.5
1900	949.9	2,905.2	3,855.1
1905	1,531.8	3,251.2	4,783.0
1910	4,863.1	507.0	5,370.1

The sudden addition to the mileage of State lines after 1905 was due to the nationalization of 17 leading private lines between 1906 and 1907, with the object of unifying railway administration and promoting the efficiency of the service. At present the private lines consist of local lines of comparatively short length. The administrative organization of the Imperial railways consists of a head office located in Tokyo, with five District Superintendent Offices to supervise the lines under traffic. For lines under construction special offices are provided to take charge of the work. At the end of 1910 the lines in course of construction aggregated about 313 miles. The existing gauge is that of 3 ft. 6 ins. The gauge being judged inadequate to meet the requirement of the steadily expanding volume of traffic, it was thought advisable to adopt the standard gauge and to reconstruct as first program the trunk line of over 700 miles from Tokyo and Shimonoseki in 13 years. A measure for this purpose has been introduced into the Imperial Diet now in session, so that it may be concluded that the reconstruction scheme will be realized in the near future.

The maximum gradient is I in 40 in ordinary cases with the minimum radius of 15 chains. A notable exception is the case of the Usui pass on the Tokyo-Nagano line for which the Abt system was adopted. The gradient for it is I in 15, for the section of 7 miles from Yokogawa to Karuizawa, with the minimum radius of 13 chains. There are 26 tunnels with the aggregate length of 14,645 ft. Altogether this section forms the worst portion in the whole work of railway construction in Japan. The steam locomotive engines used on this section at present are to be replaced with electric engines, with the double object of increasing the hauling power and getting rid of the nuisance of smoke. The work is now

under progress.

In regard to tunnelling work, that bored at Sasago on the Tokyo-Shiojiri of the Central line, is the longest. It measures 15,280 ft., required about six years, and was opened to traffic in February, 1803. In bridge work the longest structures are that over the river Tenryu (3,967 ft.), the second over the Oi (3.332 ft.), and the third over the Banyu (2.126 ft.), all in the Tokaido line. The foundation work for all such bridges is in the shape of cylindrical brick well. Superstructures are of steel generally but in rare cases wrought iron girders used in bridges made in the early days of railway construction are mixed with them. Rails used are in most cases 60 lb. per yard steel rail but they are to be replaced with 75 lb. type for trunk lines, in view of the steady expansion of the volume of traffic and the necessity in consequence to run heavy trains. The rails formerly used came from abroad, but of

late the rails turned-out at the Government Steel Works at Yawata, Kyushu, are used.

The standard dimension of the sleepers is 8" × 5½" × 7'0," and 14 to 16 are laid for every 30 ft. of rails. Chestnut wood is predominant, but owing to growing scarcity of this particular lumber, softer varieties as pines, tamo, cercidiphylum, sen, beech, are mixed, after they are properly creosoted.

The principal items of improvement work now in hand are enumerated as follows:-

Quadrupling the Tokyo-Yokohama section. The double line now existing being found insufficient to meet the requirement of the growing traffic between the two important emporiums, it has been decided to add two more lines. Of the four, two will be devoted to carrying passengers alone and will be worked with electric motive power. Shimbashi, Shinagawa, Yokohama and all other stations on the section are receiving alteration which this innovation requires.

The street railway work in the metropolis is designed to lay an elevated line across the principal streets of the city and to connect the city termini of Shimbashi, Uyeno, etc. The central station is now in course of erection at Yurakucho, not far from the Imperial Palace.

Improvement of Stations.—The existing station of Kyoto being too narrow in space, while the construction of crossings will become more and more difficult in view of the rapid expansion of the streets in the neighbourhood, it has been decided to construct at the rear of the present premises a commodious station on a elevated level. The design is now being prepared. Similar improvement is being contemplated for Osaka and other stations.

Land and Sea connection Works.—The work for effecting through connection between land and sea is either under progress or being designed for Osaka, Nagoya, Aomori, Hakodate, Muroran, Mikuni and other places.

Additional Tracks to be Laid.—This addition is to be made for sections now in single track but which is no longer able to handle with desired efficiency the growing volume of traffic. The doubling work now under progress aggregates about 216 miles. Other improvement work as about bridge girders, tracks and so forth is undertaken for the entire lines, the sum appropriated for all the above mentioned works account in the 1910 Budget amounting to Y12,000,000. To this should be added similar outlays on account of rolling stock, ferry steamers, electric plant, etc., these increasing the total improvement estimate for the year to Y19,555,000.

Of the lines now under construction may be mentioned the Central line, Toyama line, Ganyetsu line, Oita line, Bose line, Shinjo line, Teshio line and Abashiri line. The total outlay for the new lines amounts to 20,945,000 yen in the Budget mentioned above.

Beside a large amount spent in construction and improvement, there is a contemplated project of reconstructing the trunk lines on the wide gauge system, so that the future of the State railways of Japan may be said to be full of promise and interest.

Consul General Thomas Sammons, Yokohama, sends the following report to the State Department, on the conversion of Japan's railways.

In connection with the plan to provide Japan with railways of the 4 feet 8½ inches gauge it is estimated that \$22,500,000 worth of foreign railway materials will be required. It is not believed that the high-class machinery required can be supplied as yet by domestic foundries, and even though the proper grade of rolling stock, girders for bridges, and other materials could be supplied in Japan the facilities are not sufficient at present to guarantee the production of the large quantities needed.

Special meetings to consider the question of protecting and encouraging home industries are being held, the investigations involved being based upon the following memorandum:

As regards the question of broadening the gauge of the railroads, the following table of

materials which have been imported from abroad during the past five years may be usefull in preparing future budgets:

Year.	Value of materials from abroad.	Value of materials, native products, supposed to have come mostly from abroad.	Total.
1906 1907 1908 1909	\$919,708 3,719,642 070,236 998,374 3,160,649	\$340,985 1,170,819 594,269 851,468 926,540	\$1,260,693 4,890,461 1,564,505 1,849,842 4,087,189
Total	9,768,609	3,884,081	13,652,690

The amount of material supposed to have come from abroad totaled some \$3,884,081 in value, while the total value of that actually known to have been imported totaled \$9,768,109. Comparing these figures with the total amounts expended on repairs during these years, we have:

Year.	Amount expended for construction and repair.	Imported.	Per cent imported.
1906 1907 1908 1909	\$10,641,126 14,796,217 18,137,204 15,923,392 22,924,142	\$1,260,693 4,890,461 1,564,505 1,849,842 4,087,189	11.8 33.5 8.62 11.6 17.82
Total	82,472,581	13,652,600	16.55

The materials which must be imported from abroad consist of the following: Rails and their accessories, girders, machinery for machine shops, engines, wheels, and cars, and machines for the generation of electricity.

The revised estimates of the committees in charge of the scheme to broaden the national railroads limit the time to 12 years, which may possibly be reduced to 8 or 10 years, as circumstances warrant. The figures are as follow:

Year.	Annual allot- ments for 12 years.	Annual allot- ments for 8 years.	Annual allot- ments for 10 years.
1912	\$2,241,000	\$7,719,000	\$5,478,000
1913	2,988,000	15,438,000	8,466,000
1914	4,080,000	17,679,000	10,458,000
1915	6,474,000	17,670,000	13,446,000
1916	6,074,000	15,438,000	14,940,000
1917	7,479,000	14,940,000	14,940,000
1018	12,450,000	14,442,000	12,450,600
1919	13,446,000	11,212,968	12,450,000
1920	13,446,000		11,205,000
1021	14,040,000		8,070,588
1922	14,940,000		
1923	13,145,208		
Total.	113,492,208	114,547,968	111,903,588

JAPAN'S FINANCIAL AND ECONOMIC CONDITION IN 1911

That excellent compilation, "The Financial and Economic Annual of Japan" has been issued for 1912, and provides some interesting data on Japan's financial and economic condition during 1911. We take from it the following:—
"The Government has for years past been making every effort to consolidate the basis of annual account by maintaining the balance

of annual revenue and expenditure and effecting the redemption of the national debt; and in framing the Budget for the Financial Year 1911-12 on this plan, the Government has within the limits which permit of the maintenance of a strong financial basis, have made various projects which have, in view of the state of affairs at home and abroad, been rendered urgent by the course of national progress. The principal projects are the following:—

Recognising the necessity of completing the national defence in view of the latest condition of the navies of the world, the Government has made suitable alterations in the already-fixed programme of naval and ordnance construction and revised the plan of the perfection of naval defence; thus, the already-fixed continuing expenditure for that purpose has been increased by yen 82,223,170 (£8,421,916) to be spread over six years from the current financial year, the addition to the already-fixed amount allotted to this year being yen 14,860,723 (£1,523,069).

Japan being exposed to frequent inundations, the Government, recognising the necessity of making plans for a radical improvement of waterways, has decided upon a programme for the first period of the undertaking at the total cost of yen 193,087,471 (£ 19,777,473) spread over eighteen years from the current financial year, the amount appropriated for this year

being yen 12,794,750 (£ 1,310,535). Since the adjustment of the organs of communication and promotion of industrial development are matters of utmost urgency to national progress, plans have been made for the construction of several lines in addition to those already under construction simultaneously with a great improvement of the existing railways and for encouraging the construction of light railways to serve as aids in the communication between the existing railways; and the already-fixed expenditures are to be supplemented by a total sum of yen 43,172,964 (£4,422,100) in the construction expenses and of yen 52,843,369 (£ 5,412,616) in the improvement expenses, making a total of yen 96,016,333 (£ 9,834,716). The former work is to be completed in seven years and the latter in ten; and the amount to be expended during the current financial year is, if the already-fixed expenditure for the year is included, yen 23,400,000 (£2,396,804) for construction and yen 28,532,803 £ 2,922,545) for improvement, making a total of yen 51,032,803 (£5,319,349).

As it is necessary to promote the welfare and happiness of the people of the newly-acquired Japanese territory of Korea by developing its natural resources, various plans have been made in regard to the construction and improvement of railways, accommodation for land and sea connection, construction and repair of roads, aiding of various industries, and cadastral survey: and the amount required from the general account for carrying out these plans is yen 12,350,000 (£1,264,980), which when compared with the amount defrayed out of the general account during the preceding year to the former Government, shows a net increase of yen 1,360,981 (£139,402).

It has also been decided to defray so far as reliable sources of revenue permit such expenditures of urgent necessity to national development as an increase in the expenditures for educational institutions, grants to primaryschool educational funds, expenditures for the extension of the steel-foundry, and annual sums allotted for telephone exchange expenses, and an increase in the expenditures required for the improvement of the Shimonoseki Straits and construction of breakwaters in Kobe Harbour. With regard to the national debt, the past policy has been followed, and so far from a public loan being raised for the general account, yen 50,000,000 (£ 5,121,377) is to be appropriated during the current year to the fund for the redemption of the principal.

The total amount of the Budget for the Financial Year 1911-12 which was framed on the above-mentioned plan and was approved by the Diet in its twenty-seventh session, came up, the Supplementary Budget included, to yen 568,903,916 (£58,271,424) for both the revenue and expenditure. During the ensuing session the Diet passed another Supplementary Budget

for yen 5,093,081 (£ 521,672), which was rendered necessary by the revolutionary disturbance in China and an increase in the cost of army provisions due to the rise in the price of rice; and if this Budget is also included, the total amount for both the revenue and expenditure would be yen 573,096,997 (£ 58,793,096). The carrying out of the General Budget happily produced financially and economically good results.

On comparing the actual results of the revenue for the Financial Year 1910-11 with the Budget estimates, we find that among the taxes and duties in the ordinary revenue section, although there was an increase in the receipts from the business tax, sugar excise, and bourse, travelling, and succession taxes, the great floods which devastated various parts of the country led to remissions and postponements of payments of the land-tax, involving a large sum, and the receipts from the saké tax, textiles consumption tax, and especially, Customs-duties fell below the estimates, so that there was a net deficit of yen 2,940,121 (£301,149); but there was, on the other hand, an excess over the estimates of yen 3,111,266 (£318,679) in stampreceipts and yen 2,483,545 (£254,383) in the receipts from Government enterprises and State property, making a net excess of yen 4,037,432 (£413,544). In the extraordinary revenue section, the sum brought over from the preceding year's account exceeded the estimates by yen 117,781,701 (£12,064,089) and the miscellaneous receipts similarly exceeded the estimates by yen 2,813,640 (£ 288,194), the total excess in this section being ven 120.586,000 (£12,351,327). In short, the actual total revenue amounted to yen 672,873,755 (£68,920,798), which is an excess of yen 124,623,441 (£12,764,872) over the estimated total revenue of yen 548,250,314 (£56,155,927).

Next while the time has not yet arrived for ascertaining the actual results of the revenue for 1911-12, it is anticipated at present that among the taxes and duties in the ordinary revenue section, although the receipts from the land tax, saké tax, and customs-duties, may not be up to expectations, there will be large receipts from the income, business, succession, and travelling taxes, sugar excise, and bourse tax, making a net excess over the estimates of ven 4,000,000 (£409,710), and as there will probably be an excess of yen 4,000,000 (£400,710) in stamp-receipts and of yen 3,000,000 (£307,283) in the receipts from Government enterprises and State property, the total excess will be about yen 11,000,000 (£ 1,126,703). In the extraordinary revenue section, it is believed, through there will be a falling-off of about ven 6,000,000 (£614,565) in the transfers of the proceeds of public loans and river improvement fund, there will be an excess of yen 1,000,000 (£ 102,428) in the miscellaneous receipts and above all, an increased receipt of yen 76,000,000 (£ 7,784,492) in the sum brought over from the preceding year's account, and the total excess is expected to reach ven 71,000,000 (£7,272,355); and thus the actual total revenue will, it is thought, exceed the estimates by about yen 82,000,000 (£8,399,058).

JAPAN'S ECONOMIC CONDITION.

A general survey of the condition of the economic world in Japan during 1911 shows that the new enterprises which had been planned in 1910 materialised and reached the practical stage in this year; a large amount of municipal loans, debentures, and foreign public loans was issued in the home market, the work of constructing and improving railways in apan Proper and Korea was continued from the preceding year and made great progress during 1911, and there was a large volume of importations in anticipation of the enforcement of the revised Customs Tariff; that through these circumstances, the money-market which had almost touched the extreme limit of slackness in the preceding year became more and more stringent every month from the beginning of the year notwithstanding the cash redemption of internal loans to the amount of yen 65,000,000 (£6,657,790) in May and of yen 20,000,000 (£2,048,551) in December, with the result that the issue of convertible notes reached at the end of the year the unprecedented

figure of yen 435,500,000 (£44,607,190), and the rate of interest (average daily rate of discount in Tokyo) rose from 1.5 sen to 1.9 sen., and that in spite of these facts, the promising trade condition in Japan Proper and Korea was such that the year closed with our industries in a healthy state although they were not a little affected by the revolutionary disturbance in China in the last months of the year.

The amount of capital invested in new enterprises during the year was yen 361,000,000 £36,976,339), a decrease of yen 126,000,000 (£12,905,869) on the figure for the preceding year which was yen 487,000,000 (£49,882,208): but if we take into consideration the special circumstances for the decrease of capital due to the purchase by the Tokyo Municipality of the business of the Tokyo Railway Jointstock Company whose nominal capital was ven 60,000,000 (£6,145,652) and paid-up yen 43,000,000 (£4,404,384) and leave these figures out of account, the increase of nominal and paid-up capital and issue of debentures and other stocks are, as stated below, in excess of those during the preceding year; they show that we have now passed from the project stage of the previous year to the practical stage. Thus, the increase of nominal capital during 1911 reached yen 300,000,000 (£30,728,260) if we leave out the above-mentioned special case of the Tokyo Railway Company, which is an increase of yen 129,000,000 (£13,213,152) on the previous year's figure of yen 171,000,000 (£17,515,108), while the increase of paid-up capital, the case of the Railway Company being again left out, was yen 146,000,000 (£14,954,420), whereas the preceding year's was yen 131,000,000 (£13,418,007), an increase of yen 15,000,000 (£1,536,413); the issue of debentures amounted to ven 95,000,000 (£9,730,616), an increase of ven 7,000,000 (£716,993) on the preceding year when the issue was yen 88,000,000 (£9,013,623), while local loans were issued to the amount of yen 38,000,000 (£3,892,246) against yen 12,000,000 (£1,229,130) in 1910, an increase of ven 26,000.000 (£2,663,116). Moreover in 1911, a Chinese loan of yen 10,000,000 (£1,024,275) was for the first time raised in the market.

Turning, next, to the condition of the foreign trade, we find that the exports amounted to about yen 447,000,000 (£45,785,107) and the imports yen 513,000,000 (£52,545,324), making a total of about yen 961,000,000 (£98,432,859) and the imports exceeding the exports by ven 66,000,000 (£6,760,217). It is but in the natural order of progress that the total volume of trade for the year should exceed that for the year preceding by yen 38,000,000 (£3,892,246) and be the highest figure reached; and although the excess of imports which rose last year to the enormous sum of ven 66,000,000 (£6,760,217) against only yen 5,000,000 (£512,138) in 1910 was due to the facts that large quantities of articles subject to increased duties under the new Customs tariff were imported in anticipation of the enforcement of that tariff from the 17th July last, the figures for the trade with Korea which had almost invariably shown an excess of exports were, on account of the annexation of the peninsula, entirely excluded from the trade returns for 1911, and the trade. in cotton yarn and other important articles of export to China was seriously affected by the revolutionary disturbance in that country last autumn, still the fact that the principal articles of import were raw cotton, manures, iron, and machinery, all articles which are either raw materials for productive industry or are of service in its development, proves that the excess of such imports will in no way hinder the healthy development of our foreign trade.

Although the progress of new enterprises above referred to already proves that our economic world has recovered from the depression of trade, a further evidence of the fact is furnished by the business condition of the Imperial railways. The total tonnage of goods carried in 1911 amounted to 27,950,000 tons, an increase of 3,810,000 tons on the preceding year, and the receipts therefrom increased correspondingly by yen 5,240,000 (£536,720) to yen 45,850,000 (£4,696,302), while the number of passengers carried in the same year was 145,000,000, an increase of 13,000,000 on the preceding year, and the receipts from

this source increased by yen 5,860,000 (£600,225) to yen 50,000,000 (£5,121,377), making the increase from both sources yen 11,110,000 (£1,137,970) and the total receipts yen 95,860,000 (£9,818,703), the largest figure reached since the nationalisation of the railways. As this prosperous condition promises to continue, we may expect to see still better results during the current year.

WATERWORKS IN THE PHILIPPINES

The preliminary investigation and report for a water-supply system for the city of Iloilo has been made and submitted to the proper authorities. In the establishment of this system, three projects, estimated to cost as follows, were investigated and reported upon:

The population of Iloilo, Molo, and Lapaz to be covered by the water system is estimated at 55,500. The municipalities above mentioned are at present without fire protection and the local supply of drinking water is not nearly sufficient for home consumption. During the past year two considerable fires have occurred in Iloilo, one, September 2, 1911, destroying property to the value of approximately P500,000. Owing to the total inadequacy of fire protection the insurance rate in Iloilo is at present about 3½ per cent. It is estimated that Iloilo has paid out on an average P24,000 per year for drinking water, secured mainly from streams and springs on the Island of Guimaras. Drinking water is sold in Iloilo at certain seasons of the year for 3 centavos per gallon. The source of water supply for the gravity systems above mentioned is the Tigum River at a point approximately 31 kilometers northwest of Iloilo.

SAN PABLO, LA LAGUNA.

Complete preliminary investigations and plans for the installation of a gravity water system for San Pablo, La Laguna, have been made. The sources of water for the system investigated and approved are springs about 6 kilometers east of San Pablo at the foot of the San Cristobal Mountains. The estimated cost for the system complete is P81,000, and it is calculated that it will supply a minimum of 750,000 gallons per day. This supply will afford ample fire protection and sufficient water for all other purposes for many years to come. It has been recommended that a loan be granted the municipality for the partial construction of this water system.

CANOAN, SIQUIJOR ISLAND.

Lieutenant-Governor James R. Fugate, of Siquijor Island, who has been handling all construction projects on the Island of Siquijor, a subprovince of Oriental Negros, has practically completed a gravity system for Canoan, Siquijor Island. The water of several small springs was collected into one large reservoir and brought into the municipality by means of a 2½ inch pipe line. A circular fountain in the center of the town serves the whole population and eliminates the 2-kilometer walk which was previously necessary to secure potable water.

SIQUIJOR, SIQUIJOR ISLAND.

A second and more important water system has been constructed by Lieutenant-Governor Fugate in the town of Siguijor on the island of the same name. An allotment of P18,000 of Insular funds was secured for the purchase of material only, the municipal officials guaranteeing to receive the material at the ship's side and to do all the work necessary for the installation of the system. The municipality carried out its promise to the letter and constructed a main line of 4-inch and 3-inch pipe for a distance of 4 kilometers from the spring to the town, and also a distribution system which supplies all the population for 4 kilometers east and west of the town. Lieutenant-Governor Fugate has made some excellent original designs for reinforcedconcrete fountains, which have drinking troughs for horses and cattle and smaller troughs for

the smaller animals, places for washerwomen to work, and a private bath at each fountain. These fountains are located about I kilometer apart east and west of the municipality.

SAN FRANCISCO, CAMOTE ISLANDS.

A small gravity system has been completed in the municipality of San Francisco in the Camote Islands, Province of Cebu, under the direction of the district engineer, Mr. Claud Russell. The municipal officials of San Francisco voted to take a very material reduction in their salaries in order that the difference might be used for the construction of this water system, and agreed to accomplish by voluntary labor the receiving and storing of the material and the construction of the pipe line. The agreements made by the municipal officials and the people of San Francisco have been strictly carried out, resulting in great rejoicing on the part of all the people upon the completion of the water system.

ZAMBOAN, CEBU.

The municipality of Zamboan, Cebu Province, has recently appropriated several thousand pesos which have been augmented by a small Insular appropriation for the construction of a system which is less than 2 kilometers in length. The plans for this system have been approved and material ordered, and it is expected that construction work will commence during the coming month.

WATER-SUPPLY PROJECTS PENDING.

The plans for a new project, the construction of waterworks for the municipality of Pilar, Camote Islands, Province of Cebu, have lately been forwarded by the district engineer. The population to be supplied is about 1,000; the capacity of the spring is about 20 gallons per minute and the per capita supply is 28.8 gallons per twenty-four hours. The distance of the spring from the town is approximately 1,600 meters, with an elevation of 42 meters. The distribution system plan consists of 1 inch and 1½-inch pipes and the estimated cost of the project is P12,480. The municipality has requested a loan from the gold-reserve fund in order to assist it in this work.

Another project is the construction of a watersupply system in the municipality of Carcar, Province of Cebu, to supply a population of 5,000. The capacity of the spring is 28 gallons per minute and the distance of the spring from the town is 3,100 meters, with an elevation of 18 meters. The plan calls for a circular reinforced concrete covered storage tank having an inside diameter of 5.6 meters with an elevation of 2.8 meters. This tank provides for a storage of 13,400 gallons from the night run-off of the spring. The main pipe line from the storage tank to the town is made up of 31/2 inch pipe capable of delivering 60 gallons per minute into a distribution system composed of 11/2-inch and 3-inch pipes. The estimated cost of the completed work is P20,000, and the municipality has requested a loan from the gold-reserve fund to execute this work.

The municipality of Naga, Cebu Province has requested the district engineer to investigate and prepare plans for a water-supply system. These plans have just been submitted to the Director of Public Works for approval. The population to be supplied is approximately 5,000. Two springs, 1,200 meters apart, have been connected and the discharge is through a 1 1/2-inch pipe line 300 meters long into a circular reinforced concrete covered storage tank of 5 meters inside diameter and 2.8 meters in height, capable of receiving 13,000 gallons during the night. The elevation of these springs is 77 meters above the town. The main pipe line consists of a 2-inch pipe which is 1,430 meters in length; distribution system of 11/2-inch pipe. The estimated cost of the system is F9,000 and the municipality has requested a loan from the gold-reserve fund for the execution of the werk.

Another project in Cebu Province is the Tudela water-supply system. The municipality of Tudela in Camote Islands is isolated on a small island 30 miles from Cebu, and the success of the San Francisco water system in the same group of islands has encouraged them to request a similar supply. The source of the supply is

a spring 1,700 meters from the municipality, with an elevation of 155 meters. The discharge of this spring is 23 gallons per minute. As wrought-iron pipe should not be subjected to a pressure of 100 pounds per square inch, it was decided best to construct a small distribution tank near the town, with a sufficient head to give all the necessary pressure for the distribution system of 1½-inch pipe line, without valves so that no heavy pressure would result in the line. The estimated cost of the system is P4,500 and the municipality has requested a loan from the gold-reserve fund for this project.

The municipality of Sibonga, Prevince of Cebu, has also requested a loan from the goldreserve fund for the construction of gravity water system. The population to be supplied is estimated at 6,000. The spring from which this supply is to be secured is 4,300 meters from the town, at an elevation of 99 meters, and has a flow of approximately 44 gallons per minute. The plans call for a circular reinforced concrete covered storage tank. From the spring a 3-inch pipe will deliver water into Sibonga through a 21/2-inch and 11/2-inch distribution system. One hydrant will always be kept open in the municipality to cut down the pressure on the main pipe line. The estimated cost of this project 1s P20,000.

The district engineer of Cebu has also submitted plans for the construction of a water system in the municipality of Argao, Province of Cebu. This system is very similar to the design of the system for Carcar and Sibonga, described above. The main spring is 4,700 meters from the town; the main pipe line is 3,600 meters long and consists of 2½-inch wrought-iron pipe discharging into a 2-inch and 1½-inch distribution system. The storage tank will have a capacity of 9,600 gallons. The estimated cost of this project is P20,000. A loan has been requested by the municipality to execute the work.

The district engineer has also submitted plans for a water system for the municipality of Catmon, Province of Cebu. The spring is located 1,700 meters from the town at an elevation of 42 meters. It has a flow of 25 gallons per minute. A circular reinforced concrete covered storage tank of 15,000 gallons capacity will be located near the spring. The main pipe line will consist of 2½-inch wrought-iron pipe and the distribution line will be a 1½-inch pipe. The population to be supplied is estimated at 1,500, and the estimated cost of system is P6,650. The municipality has requested a loan from the gold-reserve fund for the construction of this system.

The construction of municipal water-supply systems is doing more than any other one thing toward bringing the municipal authorities and district engineers together in the performance of public works in the various provinces.

REBUILDING HANKOW

On the principle that it is a wise thing to make good come out of evil the people of Hankow are said to have decided that the new city that is to arise from the ashes of the Hankow that sank beneath the shock and flame of war shall be throughly up-to-date. With the foreign concessions as object lessons the local Chinese have perhaps realized that it is possible to live under conditions that render urban life infinitely more agreeable and better from a hygienic point of view. It was estimated that a sum of about G. \$15,000,000 would be required to build a city with wide streets, an up-to-date Bund, electric street car lines and adequate public buildings. How to obtain this money was the problem, and still is the problem, more especially as the Central Government, itself hard pressed for funds, looked askance at any proposal from the provinces that they should make incursions into the loan market.

It has been reported, however, that the enterprising Robert Dollar Company had arranged a loan of from £3,000,000 to £4,000,000 sterling with the provincial authorities on the security of the provincial revenues. In addition to this a contract for woodblocking the principal streets of the new city had been secured for the Standard Lumber Company with which the Robert Dollar Co. is allied.

The loan is to be devoted to the construction of a city up-to-date in every particular.

When the project of rebuilding first came up for serious consideration a Bureau of Reconstruction was appointed. This body was appointed by the military government and it carried on its operations without paying any attention at all to the property owners. As a matter of fact the majority of the property owners had fled while the fighting was going on and the Bureau started laying out their plans before they began to return. When the owners realized that disposition was being made of their property without consulting them they demanded that they should have some say in the matter. Representations were made to General Li Yuan-hung who ordered the owners and the Bureau to talk the matter over. This conference seems to have resulted in the Bureau forming itself into a kind of tribunal to decide upon questions raised by the owners. These were eight in number and the questions or demands and the answers are as follow:-

ment shall go security for the loan, and that the Hankow taxes shall not be pledged for this purpose. Answer: Since the loan in question (the Robert Dollar loan) has been passed by the Advisory Council at Peking and duly sealed by the military government of Hupch, there is nothing more to be said about it.

1. It is demanded that the width of the

If 2. It is demanded that the width of the roads shall be reduced, and the big foot measure made smaller. Answer; The number and position of the new roads having now been finally fixed it would be exceedingly difficult to make any alteration, but, as to the breadth of them, this can be reduced at the time of construction by a common understanding.

3. It is demanded that the value of the properties shall be fixed by the owners in the various localities so that they shall not suffer loss, and that the registers of the former land office shall be accepted as the proof of area. Answer: As the value of the properties has already been fixed by the Bureau, it will be necessary to ask the Tutuh to appoint a committee of representatives of the owners, of the Chamber of Commerce and of the Bureau to deal with the question and to settle it on the lines of uniformity.

4. It is demanded that all the land required for road construction shall be paid for with ready money. Answer: All private property taken up will be paid for with ready money, or, if an owner objects to the amount, an equal area of land in a similar situation will be given him by the Bureau.

5. It is demanded that the unburned buildings at both ends of the town shall be left untouched. Where there are large buildings the new roads shall be carried round them, but smaller buildings may be removed on the payment of proper compensation. Answer: The buildings remaining at both ends of the town shall not be disturbed in the meantime, but when the new streets are built up to them then they must all come down. With respect to temples and guildhouses, where they are very large, an effort will be made to go round them, but, if this is not possible, compensation will be paid for their removal and re-erection on another site.

6. It is demanded that the property owners shall have a say in the amount of taxation which may be imposed. Answer: Taxation is a matter which concerns the Central Government and must pass the two houses of Parliament; the Bureau cannot take any responsibility with regard to this matter.

7. It is demanded that in the bunding of the river banks provision shall be made for the safety of boats and the convenience of traffic. Answer: The suitable bunding of the banks of both rivers so as to give the greatest facility for trade is a main object of the scheme; it ought not to be supposed that this has not been seen to.

8. It is demanded that, after the streets, lanes, paths and drains have been laid out, the people shall have authority to build their houses in any way they please. Answer: There is no civilized country where the people are allowed to build any kind of houses they please: this demand cannot be entertained.

REINFORCED CONCRETE TESTS

The rapidly increasing demand throughout the Far East for reinforced concrete in building and other construction uses, has led one of the leading American manufacturers of reinforcement steel, to detail a special engineer to cover this important field, and operate in conjunction with their various agents. The Trussed Concrete Steel Co., of Detroit, manufacturers of the well known Hy-Rib and other specialties, employed in the Kahn System of Reinforced Concrete, early recognized the possibilities of

The Trussed Concrete Steel Company recently detailed the engineer of their London house, Mr. N. K. Fouguer, to cover the Far East and work in conjunction with their various agents in this field. In Singapore, Mr. Fouguer conducted three tests in the presence of the leading engineers of that port, which will prove of interest to our readers.

SLAB NO I.

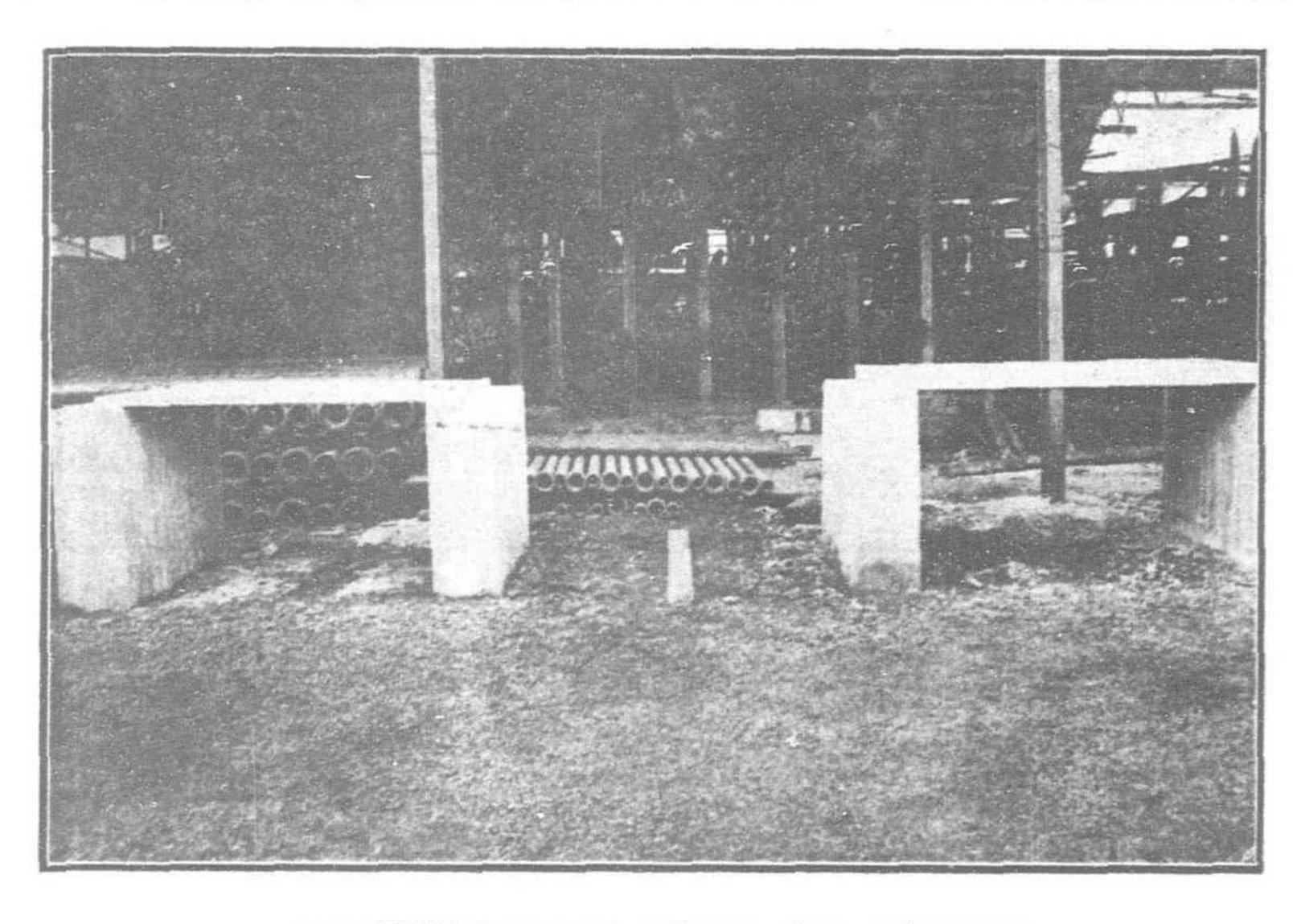
The first test panel was constructed of a 2 inch Concrete Slab reinforced with 24 Guage 4 Rib

The Slab was constructed on 18th March. and tested to destruction on the 27th April, 1912. having an age of 40 days.

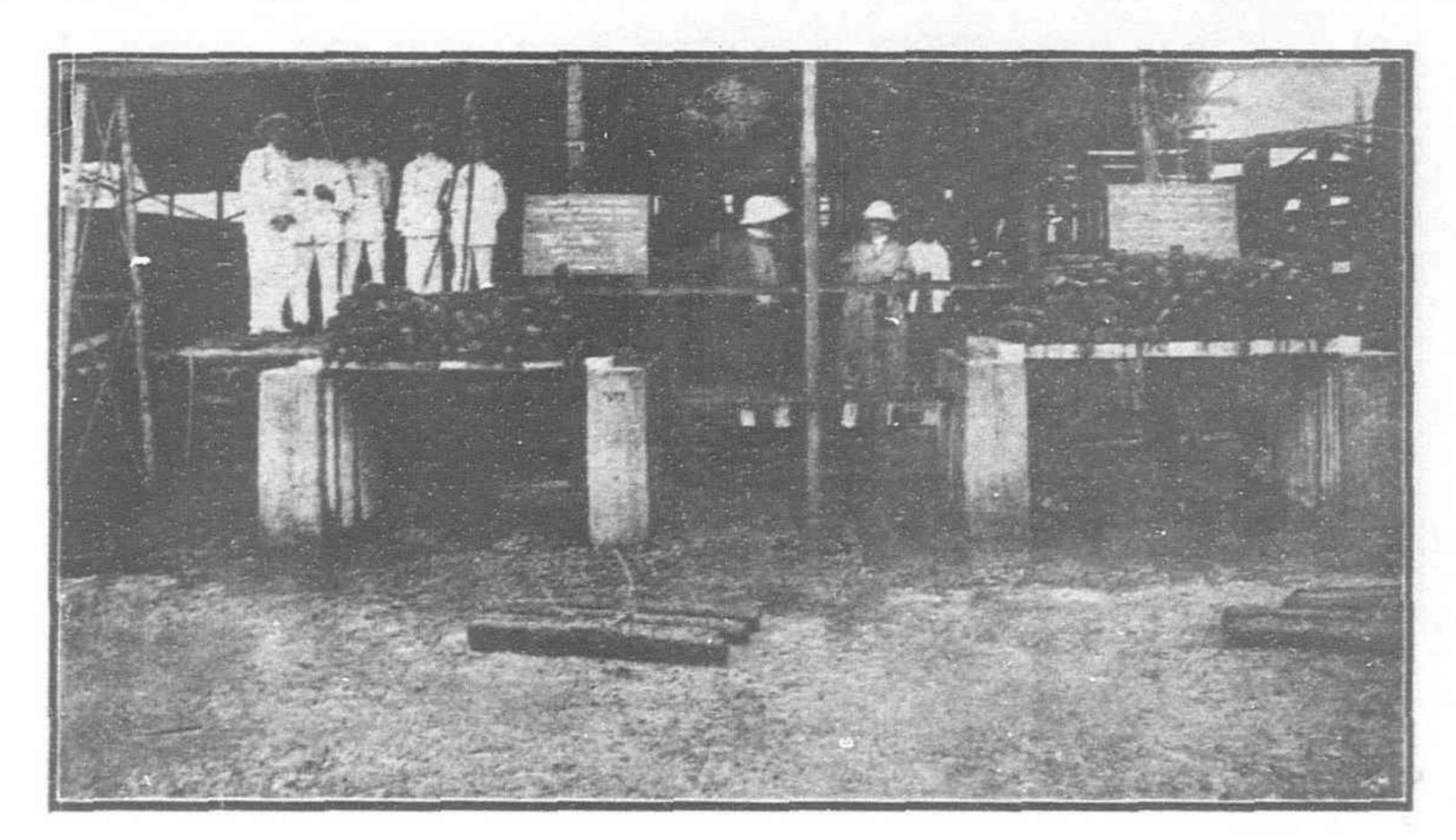
Ordinary Pig Iron was used for loading and was carefully weighed on scales immediately before being placed on test panel.

The following tabulated results give full information about the loads and corresponding deflections.

It will be noticed from the table that the slab carried more than 51/2 times the superinbosed load for which it was designed with a



CONCRETE SLABS READY FOR TESTING



LOADING SLABS WITH PIG IRON

the Orient as a market for their products, and their pioneer work covering several years has largely contributed to the increased employment of this style of construction. Where other manufacturers have remained content with the occasional order through commission houses. leaving their agents to push the sale of their products, this enterprising American concern, has conducted a liberal propaganda by advertising judiciously in the engineering publications, and sending out special men to assist their agents, and by many public tests in the various ports. In a part of the world subjected to earthquakes and typhoons, where pestilence and plague, soon renders the ordinary wood, wattle. or brick construction, a focus for the spread of

other portion of the globe. In the Philippines, the use of reinforced concrete for building construction has practically superseded wood and brick, and its use is speading rapidly in the Straits Settlements and Federated Malay States.

disease, the necessity for some cheap, strong

and sanitary construction, is greater than in any

Hy-Rib, resting on 14 inch Brickwalls; 5 ft. o inch clear span between supports. Walls were 4 ft. high, and the Slab had 6 inch bearing on top of each wall.

It was designed for a superimposed load of 112 lbs. per sq. ft. with a factor of safety equal to about 31/2. (Tables in Hy-Rib Hand Book are based on Bending Mom. WL i.e., for continuous spans, and the factor of safety for such conditions equals 4.)

Concrete was mixed 1:2:4. i.e. one part Cement, two parts Sand and four parts 3/4 ins. broken Granite.

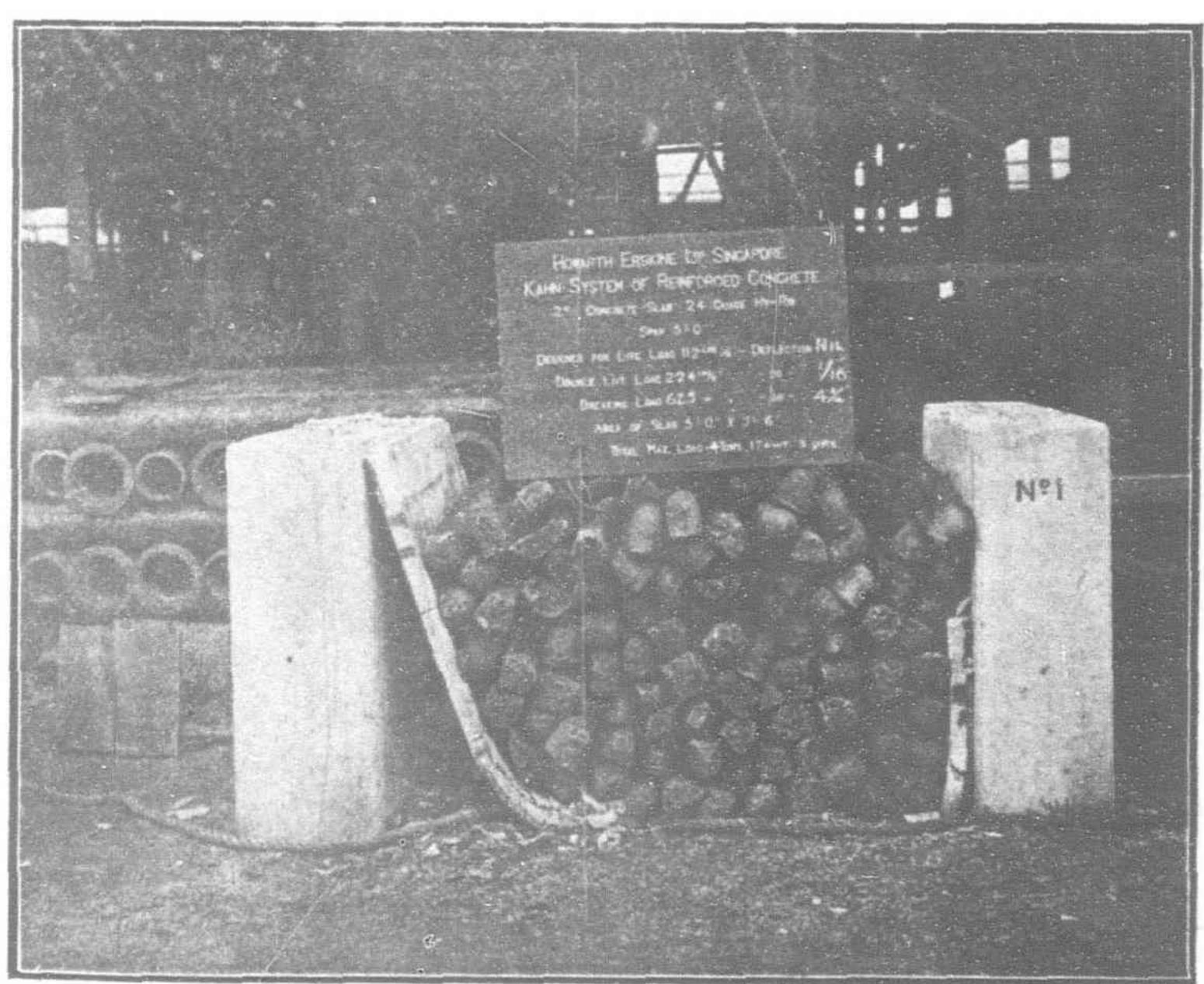
The sand and stone were of excellent quality, the Cement was not tested, but looked well, judging from a superficial examination.

The width of test panel was 3 ft. 6 ins. while the actual clear span measured 5 ft. 03/4 in.

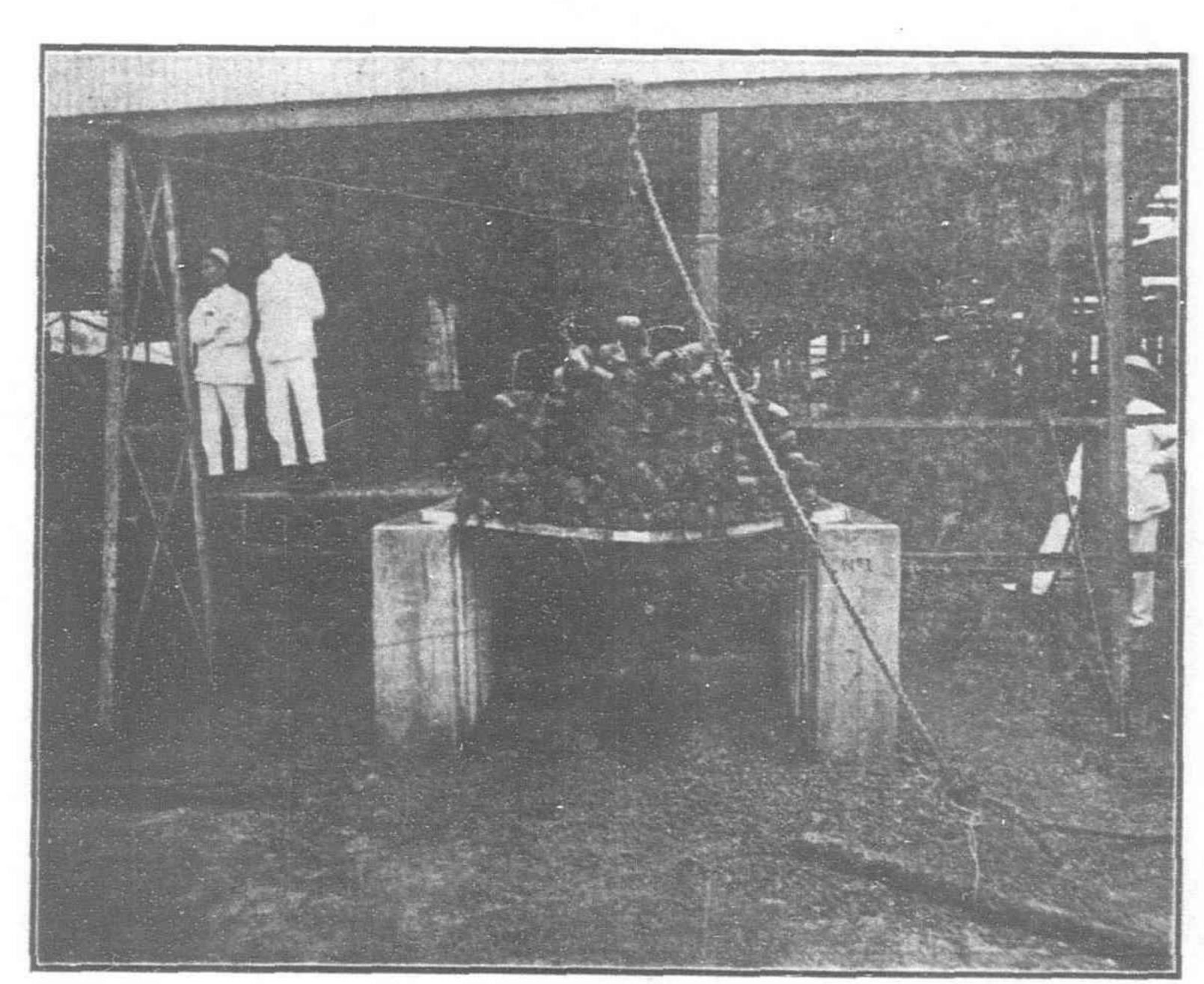
One half of underside of Slab was back plastered clear across the span, while Hy-Rib was left exposed in the other half to show construction.

LOADS APPLIED TO TEST SLAB NO. 1-5 FT. O IN. X 3 FT. 6 IN. X 2 IN.

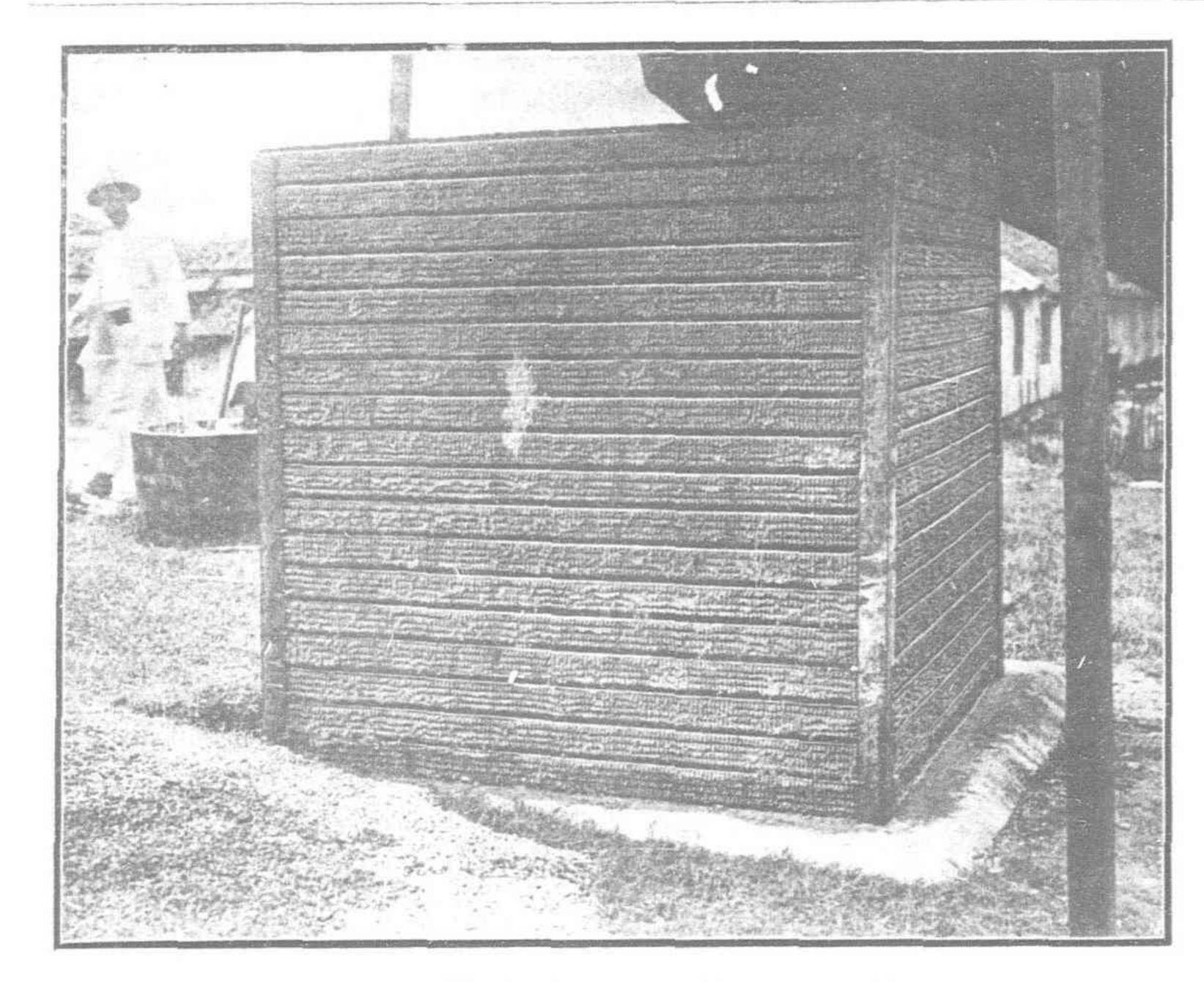
No.	Loads.	V	eigl	ht	Deflec- tions,	Load per Sq. Ft.	Remarks
		cwt.	qrs.	1bs.			
ıst	Pig Iron.	17	2	20	Nil.	113.1	
2nd	,,,	17	2	15	1/16"	225.2	Slight fracture a
3rd	11	8	3	04	1"	282.23	one end
4th 5th	,,,	8	1	04	/32"	335.26	centre in centre in plastering on under-
6th	,,	1 7	1	19	8 7''	434.45	Cracks
7th 8th	,,,	6	2	o6 o5	11''	476 40	to edge of
9th 10th 11th	**	3	3	14	23"	526.90	
12th	91	4	2	12	31"	565.70 595.82	
13th	27	4	2	12	43''	625.30	Total collapse.
Tot	al Weight	97	2	23			

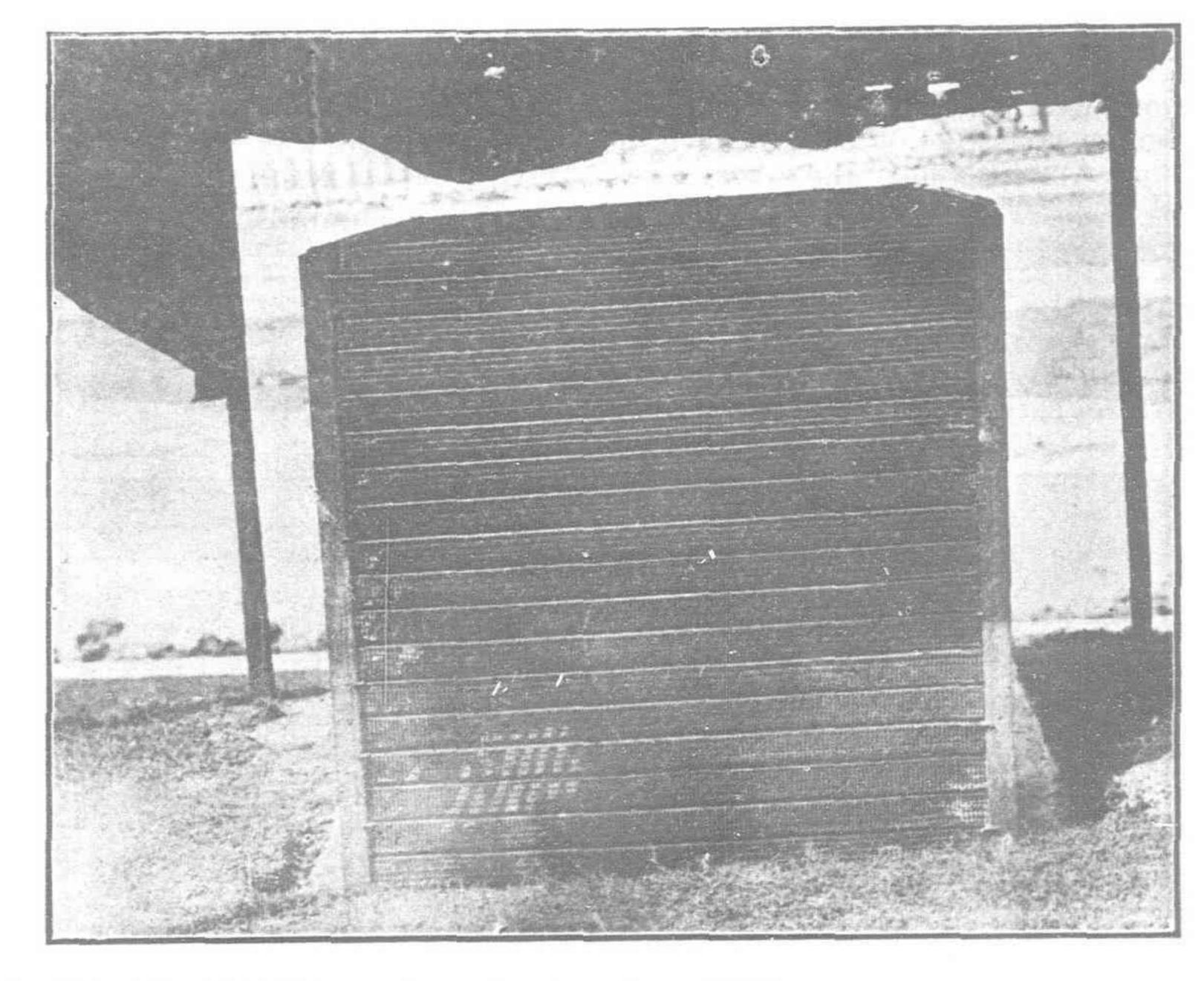


COLLAPSE OF NO I. SLAB



DEFLECTION OF SLAB





TEST TANK, 5 × 5 × 5 FEET, WALLS 3 INCHES THICK, CONSTRUCTED OF HY-RIB METAL

total deflection of 4% inches in the centre just before the moment of collapse, and this result is considered extremely satisfactory from every point of view.

The final collapse was caused by the concrete failing in compression, which is clearly proved by an examination of the broken slab.

At the time of the last deflection reading, the Hy-Rib resisted a tensile strain of about 90,000 lbs. per sq. inch which is fully thirty per cent, better than the ultimate strength generally specified for steel reinforcement.

The ultimate compressive strength on extreme fibre of concrete just before failure, was about 4,200 lbs. per sq. inch, which is also a very excellent result.

The cement used was: "Red Hand Brand": and the Slab was kept thoroughly wet and covered up for 8 days after being made.

The above results were obtained by using local materials and native labour in connection with the Kahn System Hy-Rib, and it will readily be seen that Reinforced Concrete can be made fully as strong and reliable in this Country as anywhere else, if the proper care is taken in the construction.

Loading of Slab started at 2.45 p.m. and

collapse occurred about 4.45 p.m.

The numerous photographs taken illustrate the test fully, and it will be noticed on these

that cracks have been marked on Slab with a piece of chalk in order to make them more noticeable.

SLAB NO. 2.

This Slab was designed for a superimposed load of 224 lbs. per sq. ft. and constructed of 3½" Concrete Slab reinforced with 24 Guage 4 Rib Hy-Rib, resting on 14" Brickwalls 4 ft. high.

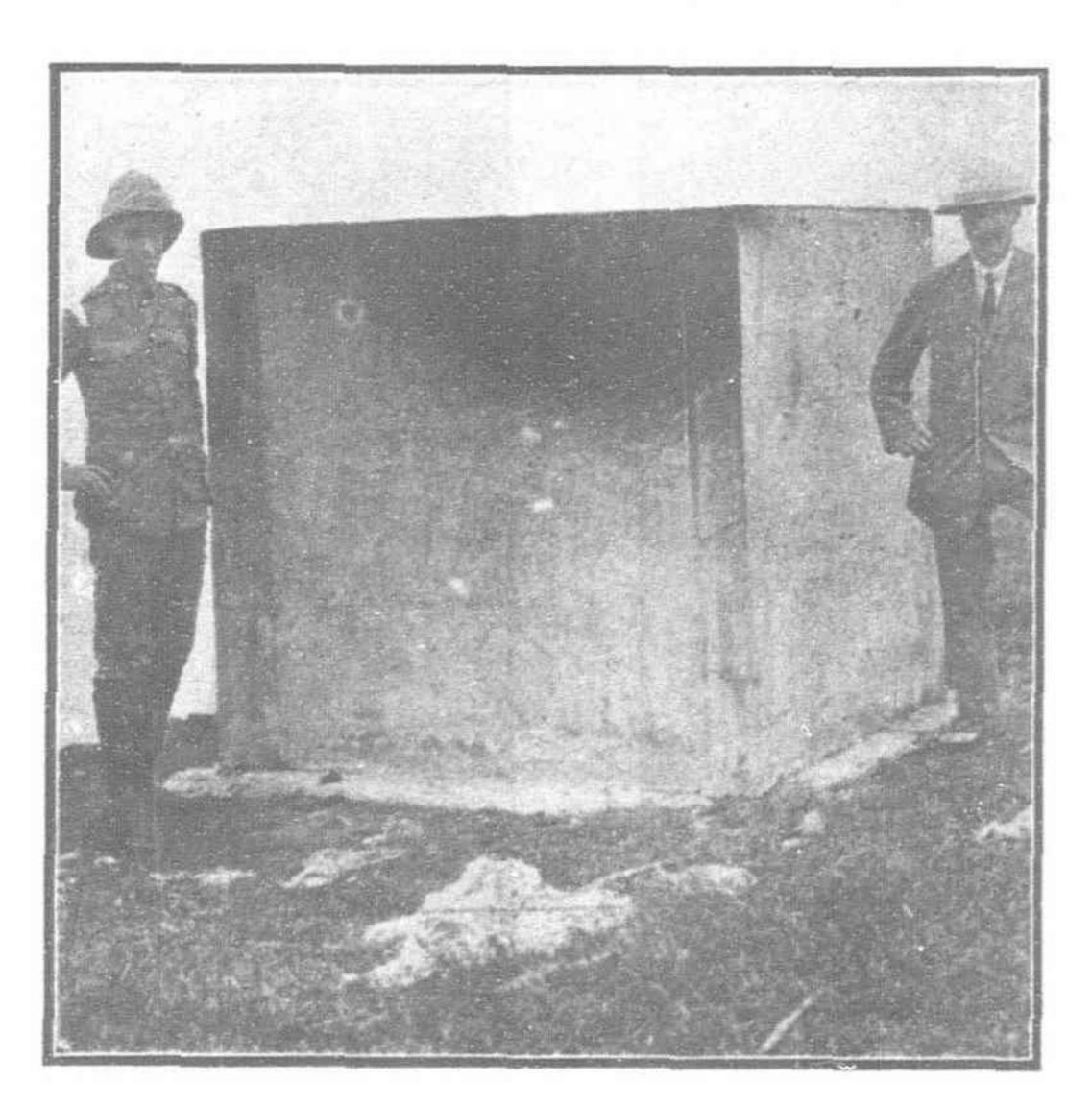
The clear span was 6' o" and the Slab had 6 inch bearing on each wall. Concrete was mixed 1:2:4, and conditions were very similar to Slab No. 1.

Width of Slab was 3' 6", and half of underside was back plastered across entire span, while in the other half, Hy-Rib was left exposed for inspection.

Slab No. 2 was constructed on 16th March and tested on 27th April, 1912. The intention was to load it up to destruction, but from the experience with No. 1 it could be readily seen that special arrangements would have to be made in order to accomplish this; and it is doubtful if it would have been possible to break the slab by loading with Pig Iron, unless special platform with cantilevers out on both sides of slab had been made to receive the load, and a cradle had been provided to prevent the Iron from falling off.

As it was getting dark and the spectators were highly satisfied with the results from Slab No. 1, it was decided to load Slab No. 2 with the double load and observe deflections.

At a superimposed load of 224 lbs. per sq. ft. the deflection in centre of span was $\frac{1}{32}$. When the load was doubled, making a total



superimposed load over the centre of the slab equal to 448 lbs. per sq. ft., the deflection was $\frac{3}{16}$ ". This double load was left on Slab for 3 days, and, on removing the Pig Iron on the 30th April, the Slab went back to its original position, leaving a permanent set of less than $\frac{1}{16}$ ". It was raining very heavily during both tests of slabs.

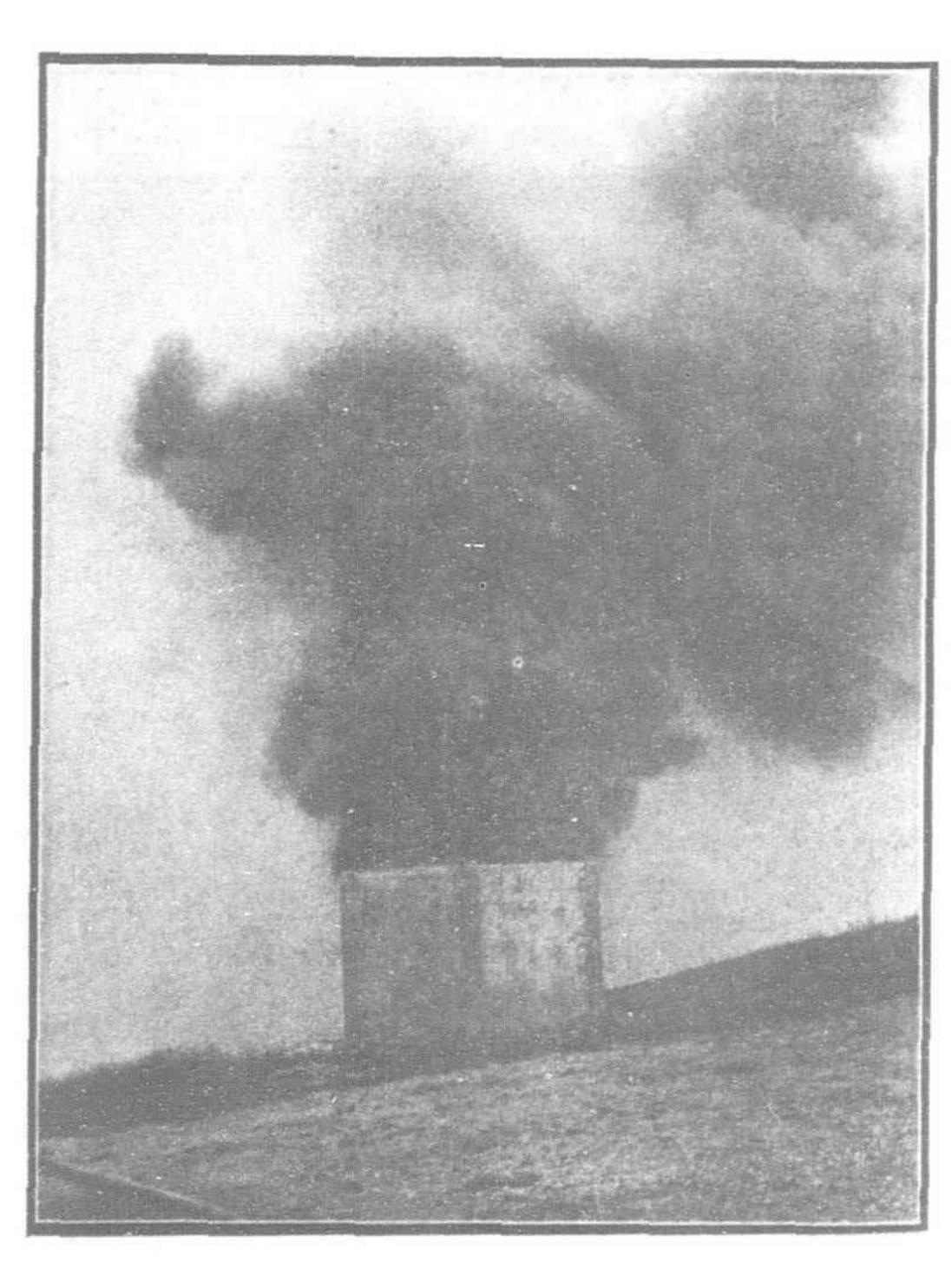
As will be noticed from the photographs the loads were gradually getting more and more towards the centre of spans, and this of course tended to increase the bending moments very considerably.

No arch-action was possible in the way the Pig Iron was placed, and it was agreed that both tests were fair and proper in every way.

TANK.

The test tank was 5 x 5 x 5 ft. inside dimensions, walls were 3 ins. thick, plastered on 24 Guage 4 Rib Hy-Rib which was run horizontally.

In each corner was placed vertically one 2¾ ×2¾ ×¾ in. steel angle to which Hy-Rib was attached by clips and wiring. The bottom was about 2" thick on top of the 24 Guage 4 Rib Hy-Rib, and a 6 inch ordinary Concrete Foundation Slab carried the Tank.



PHOTOS OF TANK UNDER FIRE TEST, AND THE TANK AFTER COMPLETION OF TESTS

The last plastering coat was put on and the tank completed on 2nd April, and the water and fire test took place on the 1st May giving an age of only 29 days. Water had been filled in tank for two weeks before test i.e., when it was only two weeks old.

The mortar plastering was made up of—5 parts Cement; 12 parts Sand; 1 part Limepaste, 1 part Trus Con Waterproofing Paste was mixed (to every 12 parts of water used) to

make the Tank watertight.

The first test was started at 8.30 a.m., 1st of May, when a thorough inspection by the Engineers and Architects present proved that it was absolutely watertight without any leaks whatever.

The water had remained in tank for two weeks, causing a pressure on sides near bottom

of about 300 lbs. per sq. ft.

The tank was now rapidly emptied by means of a syphon and a reading was taken with a transit on the centre point of one side, but no deflection whatever had occurred from the water pressure.

One hundred and sixty gallons of kerosine oil was now poured in, and at 9.15 a.m. this was put on fire. In a moment the flames rose high above the Tank, which from thence resembled a roaring furnace and the heat was terrific. Horizontal readings of the deflections of one side were taken by means of a transit and gave the following results:—

" " " 16 " ... 16 "
" " 45 " ... 16 "
" " I Hour ... 18 "
" " " 2 Hours.. ... 18 "
" " " " 23 " 58 "

The oil was all consumed and fire ceased at 12 noon, after a continuous blaze of 23/4 hours.

Horizontal cracks started to appear after about 15 minutes, and small explosions were heard, but during the entire Fire, neither Oil nor flames penetrated the walls, and the Hy-Rib construction certainly proved a highly effective type of fireproof material, which

should win the approval of all building Authorities in the East as it has already done in other

countries.

At 12.30 p.m. a firehose was played on the sides to cool the tank and it was filled with water up to 18" below the top, while still very warm.

Naturally the water leaked out of some of the cracks, but otherwise the walls still maintained strength and elasticity enough to resist the water-pressure.

Considering that the Tank had contained water for 2 weeks and that enormous heat was immediately applied to the damp surface, after water had been siphoned out, the test was an extremely severe one and proved definitely the Kahn System's claims for a Fireproof, Oilproof and Waterproof Construction.

The Hy-Rib Reinforcement was not damaged in any way, and the outsides of Tank looked perfectly well with the exceptions of the cracks.

The level of Oil in Tank when fire started was about 12 inches from

the bottom.

Slight repairs have since been made to the plaster and the Tank filled with water, the result being that it still continues to be watertight and is ready to again demonstrate its ability to withstand an equally severe fire test.

DEFIANCE HUB TURNING MACHINE

DEFIANCE MACHINE WORKS

The No. I Patent Automatic Hub Turning Machine illustrated herewith, is the largest and most powerful machine of its class, designed especially for making carriage and wagon hubs of different sizes and shapes up to 18" diameter, 18" long at the largest, having a capacity for finishing 600 heavy hardwood hubs in ten hours, or roughing out 2,500 blocks.

This Machine receives the block in its rough state, performs the roughing, turning, cupping, tinishing the ends, cutting beads and shoulders for bands, making hubs any shape or size complete at one operation more uniform and perfect and at an immense saving over hand turning.

The Frame of this machine is composed of iron, a massive casting in one piece, of neat design and of sufficient weight to stand firm and perform the heaviest turning without jar

or injury to the working parts.

The Carriage is built in two parts. The lower half is gibbed and fitted to the frame in angular ways, with adjustment horizontally in line with the mandrel by hand-wheel and screw to center the knives with the turning. The upper table with the roughing and mishing knives attached at either end is mounted upon and gibbed to the lower table, and it slides from right to left at right angle with the mandrel by turning the large hand-wheel to bring either the roughing or the finishing knives up to the work to be turned.

The Roughing Knife is 18" long and it is held in a stand at the back end of the sliding carriage with its cutting edge extending downward, and when in operation removes the surplus material from the hub block in the form of a veneer or ribbon 1/8" thick, full length of hub, at one cut, requiring no adjustment for length or diameter of block. A gauge governs the depth of cut

The Patent Finishing Knives are located at the opposite end of the carriage from the rougher knife, with their cutting edges extending upward, consisting of a body knife with cutting edge shaped to correspond with the style of hub to be turned, and flat knives at either end for cutting the band seats and cutting off the hub to the proper length.

The Cupping Attachment is gibbed to the tail stock and provided with a gauge to regulate the depth of cut. The shape of knife governs the style of cup. A special back cupping attachment can be furnished when so ordered, which attaches to the carriage of the machine

A Powerful Friction Clutch, fitted upon a 3" steel spindle driven by an 8" belt, communicates power to revolve the hub. The frictions are engaged or disengaged by a convenient foot treadle. A single movement of the operator's foot upon the treadle instantly starts or stops the machine without changing the position of

the operator or shifting the belt.

The Operator has complete control over the machine from the working side. As the material to be operated upon revolves, the roughing knife is first presented to its action by turning the large hand-wheel to the left, reducing the hub block to the proper diameter for the finishing knives. By a reverse movement, the roughing knife retreats, and the finishing knives which shape the hub to the desired form and length are brought into service. The diameter of turning is regulated with graduating screws attached to the carriage, and when once adjusted for hubs of one diameter no further adjustment is required, and all hubs will be turned to exact size and shape at one starting and stopping of the machine.

The Countershaft is 236" diameter, 56" long; two No. 3 hangers, 28" drop; one belt shifting apparatus, complete; one driving pulley, 40"

Friction Pulley on machine, 20" × 8"; speed, 800 rotations per minute.

x 8"; tight and loose

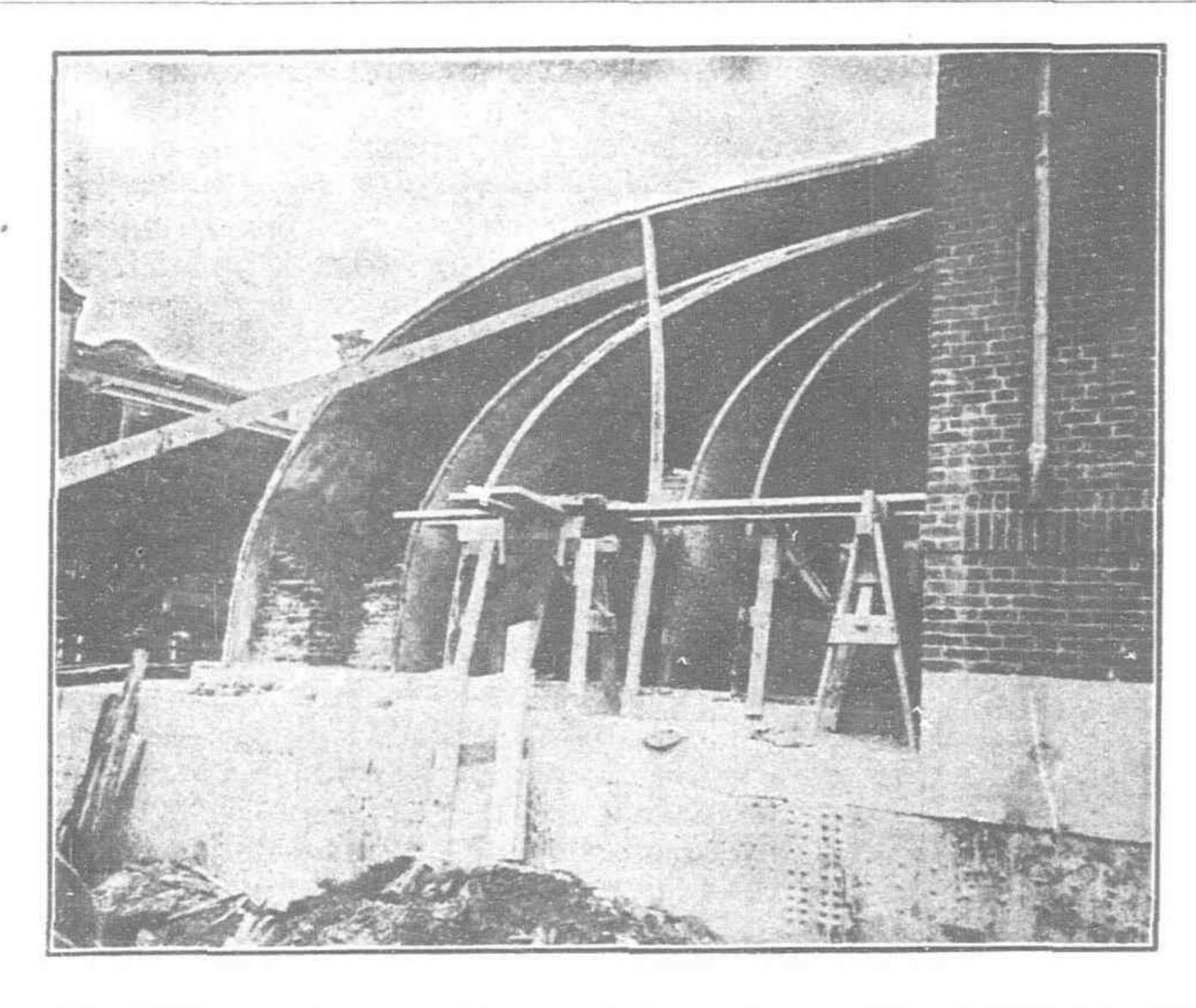
pulleys, 20" × 8"; speed, 400

material, which and the amount of feed.

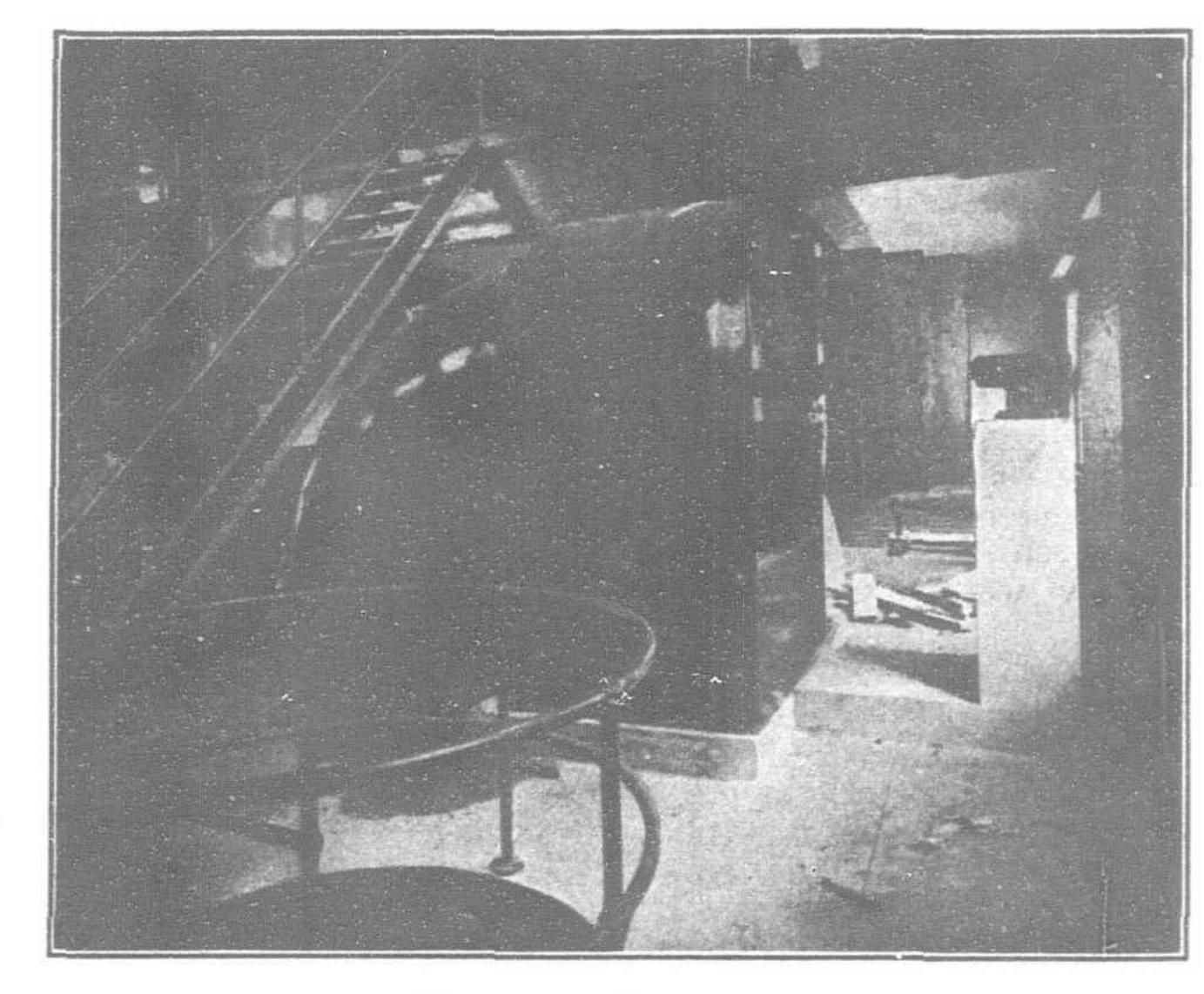
Horse Power to drive, 6; floor space occupied, 48" × 84".

THE BEFLANCE MACHINE WORKS, DEFLANCE, OHIO, U.S. A. S. N. T. D.

DEFIANCE MACHINE WORKS, NO. I PATENT AUTOMATIC HUB TURNING MACHINE



DISCHARGE DUCTS ON NO. 12 DOUBLE INLET PRESSURE FAN (UNDER CONSTRUCTION)



NO. II "SIROCCO" EXHAUST FAN

VENTILATION OF THE PENN-SYLVANIA TUNNELS AT NEW YORK CITY

BY B. W. BENNETT, M.E.

At the time of the building of the new Pennsylvania Railroad terminal at New York City, the ventilation of the fifteen and a half miles of tunnels leading from the station at Seventh Avenue and Thirty-third Street under the Hudson River to Hackensack, New Jersey, and under the East River to Long Island City, and running the full width of Manhattan Island, under the city, was considered a matter of prime importance.

In the design of such a ventilating system, two main factors had to be considered. First, it was absolutely necessary that sufficient ventilation be supplied to make the tunnels safe under all emergency conditions, and second, it was highly desirable that such a standard of purity be maintained, that passengers should suffer no discompture during times of normal operation, due allowance being made for occasional irregular spacing of trains. In order to obtain these results, it was decided to maintain a standard of purity in the cars of not more than eight parts of carbon dioxide in ten thousand parts of air. This was equivalent to supplying thirty cubic feet of air per minute to each passenger, and in the case of the tunnels under the East River was equal to approximately a twenty minute air change. To insure that the full amount of air desired be supplied to the occupants of the cars, it was decided to deliver to the tunnels lifty cubic feet of air per minute per person, or two-thirds more than was actually required to maintain the desired standard of purity.

The first and most important feature to be considered, with respect to the ventilating system, was the general lay out or scheme and

various systems for obtaining the requisite ventilation by exhaust, by pressure and by a combination of both were considered. After due consideration, the system found to be best adapted to local conditions was a forced draft system of the same kind as used for ventilating a number of railroad tunnels going through the mountains. In this system, the air is introduced in a stream of constant flow, through a divided nozzle which delivers it on each side of the tunnel through evase or expanding outlets. placed in the bench walls. In every case these outlets direct the flow of the air stream in the direction of traffic in the various tubes or tunnels. After the installation, it was found by test that a decided injector effect was obtained by the use of these special outlets. This effect was so pronounced in the case of the North tunnel under the Hudson River, that a strong current of air was induced, which flowed from the East entrance of the tunnel toward the fan, which is placed about seven hundred and fifty feet from this entrance and blows toward the West end of the tunnel.

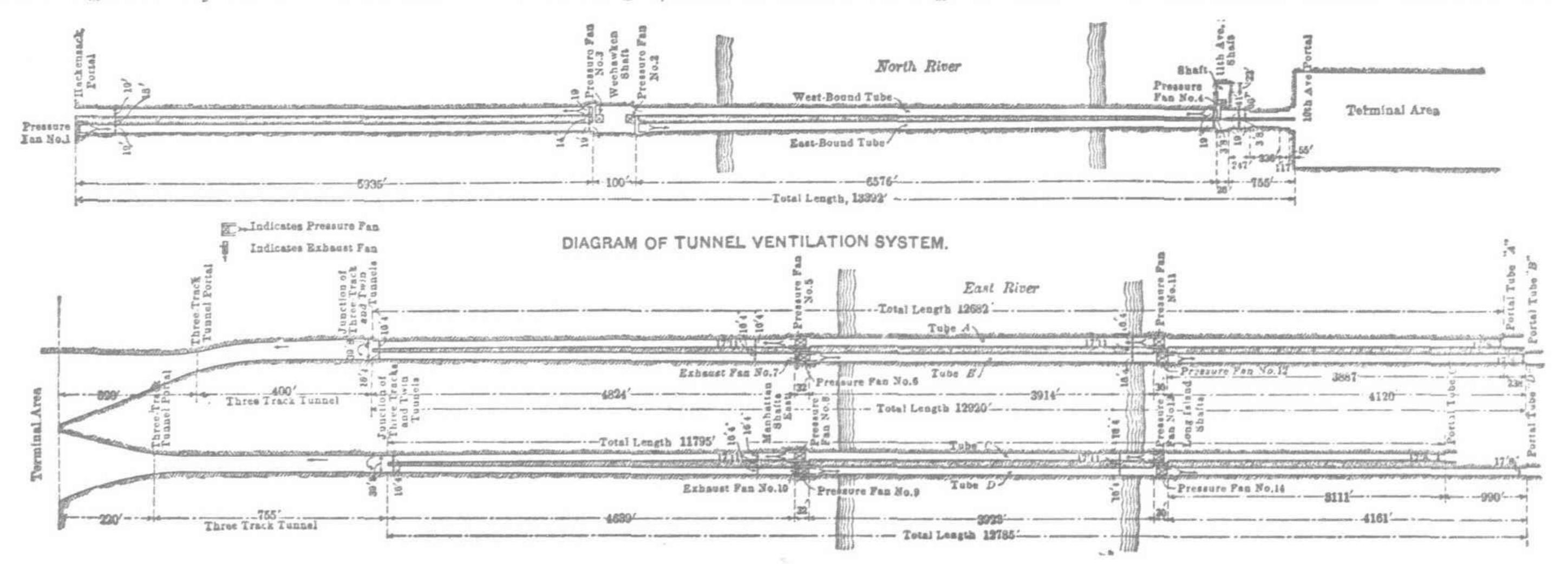
A further advantage obtained by the use of the system described above is the absence of obstructing duct work in the tunnels, thus leaving the side benches entirely free for walkways. The ducts leading from the fans to the various nozzles were designed in each case to suit local conditions, particular attention being paid to the elimination of sharp bends, which would result in losses due to friction. Care was also taken that there should be no abrupt changes in cross section in these ducts, as such changes would result in sudden changes in the velocity of the air and a consequent loss due to conversion and eddy currents. The accompanying photograph of these ducts, taken during erection, illustrates the great care given to this part of the installation.

A diagram of the tunnel lay out and of the ventilating system is shown in Fig. 1. The

upper diagram shows the lay out of the system extending from Hackensack to the terminal area, and the lower diagram the lay out of the system extending from the terminal area Long Island City. The direction of the flow of the air from the various fans is indicated by arrows. In each case this is in the direction of traffic in the individual tunnels. The tunnels are so constructed that each tube is entirely separated from the others, thus preventing the by-passing of air between the tubes, which condition has proven so detrimental in the case of the subways in London and in other notable cases.

After the volumes of air required for the various sections of tunnel had been determined by the engineers of the Pennsylvania Tunnel and Terminal Company, the plans of the tunnels, shafts and fan houses were sent to the fan manufacturers with a request for recommendations and proposals for the fans to deliver the required volumes through the various systems as indicated on the plans. There are fourteen fans in all, twelve of which are used as supply fans. The other two fans which are located at First Avenue are exhausters and draw the air from the terminal area through the South tunnels under Thirty-third and Thirty-fourth Streets. These fans were so arranged in order to prevent the vitiated air from the North tunnels under these streets from being blown up into the station proper. The two accompanying photographs show a typical double inlet supply fan and one of the exhaust fans.

The fans used are "Sirocco" fans, and are particularly adapted to this work due to the relatively small space as occupied by a fan for a given volume and due to their high efficiency. These fans have wheels of the multiblade, drum type. Some of the fans are double inlet fans while others are of the single inlet type. The type used at each location is given the table of test results below. The fans are all belted



to induction motors and are equipped with three step cone pulleys, by which speeds of 70% and 40% of the maximum can be obtained.

After the installation was completed, tests of all the fans were made by the engineers

of The Pennsylvania Tunnel and Terminal Company and of The American Blower Company. A tabulation of the results obtained is given below, together with a list of the location of the various fans.

Anemometer tests in the tunnels showed that the average air velocity due to the operation of the fans alone was about eight miles an hour, but this is increased to as high as thirty miles an hour due to the piston action of the trains.

TEST RESULTS-PENNSYLVANIA TUNNELS FANS.

LOCATION.	Fan No.	Blower or Exhauster	Direction of Air	Diam. Wheel in Inches.	Approximate length of tunnel ventilated, in feet	Fan capacity at normal speed, in cubic feet per minute.	Velocity at fan outlet, in feet per minute.	Brake Horse Power at Motor.
North River-Hackensack Portal. Building over Portal	1	В	E	60	5,900	87,000	3,920	48.6
North River. Weehawken Shaft, in room between	2 3	В	E W	60 54	6,600 6,000	125.800 100,800	5,670 5,586	97-0 56.8
in room at track level on north side of west bound tube East River—First Av. Shafts, in	4	В	w	60	6,600	107,000	4,330	68.5
At ground level over tracks	5	B	W	72 54	4,800 3,900	100,000 60,000	3,130 3,330	62.0
3 and 4	7	E	E	66	4,800	59,200	4,400	27.9

TEST RESULTS-PENNSYLVANIA TUNNELS FANS. - (Continued.)

LOCATION.	Fan No.	Blower or Exhauster	Direction of Air	Diam. Wheel in Inches.	Approximate length of tunnel ventilated. in feet	Fan capacity at normal speed, in cubic feet per minute.	Velocity at fan outlet, in feet per minute.	Brake Horse Power at Motor-
East River—First Av. Shafts, In building located at ground Level over tracks 1 and 2 East River—Long Island City	8 9 10	B B E	W E E	72 54 66	4,800 3,900 4,800	100,000 60,000 59.200	3,130 3,330 4,400	62.0 21.0 27.9
Shafts, in building located at ground level over tracks 3 and 4	11 12	В	W E	54 54	3,900 4,100	65,000 65,000	3,600 3,600	24.3 24.3
at ground level over tracks	13 14	B	W E	54 54	3,900 4,200	65,070 65,000	3,600 3,600	24.3 24.3

SEWERAGE SYSTEM FOR HAVANA, CUBA

Henry R. Worthington, 115 Broadway, New York, have just forwarded to Havana, through the Cuban Engineering & Contracting Company, the well-known contractors who have in charge the sanitization of the city of Havana, three of the largest pumping units ever exported from the United States for such service.

Each of these units consist of a 36" special Worthington vertical shaft, double suction impeller, volute, centrifugal pump, with equipment of shafting, couplings, bearings, etc.

Each pump has a capacity of 46,000,000 gallons per 24 hours, and is arranged for connection to 42" suction pipes and 36" discharge pipes.

Each of these machines will be operated by a 240 kw. General Electric vertical motor, direct connection being made between the hydraulic and electric rotors.

Included with these three units will be all necessary accumulators, triplex and centrifugal oil pumps, with motors, complete oil feed and oil filter systems, special electrical controlling devices, etc.

These equipments will be placed in a station located at Casa Blanca, across the Bay from Havana City.

All the sewerage from the City will be delivered to this station through tunnels underneath the harbor and the mammoth pumps described will then force the same across the ridge back of Casa Blanca and far out to sea.

The pumps in question were designed and manufactured under the direction of the ablest and most expert hydraulic engineers and, undoubtedly, represent the highest grade ever

reached in the production of this class of machinery.

All details of the machines were subjected to the closest scrutiny throughout the entire period of their manufacture, especial attention being given to the matter of high efficiency.

LIMA LOCOMOTIVE CORPORATION

The Lima Locomotive Corporation has sold to Redmond & Co. the entire issue of \$2,000,000 first mortgage 5% 20-year sinking fund gold bonds, callable in all or in part at 110 on any interest date.

Proceeds will be used for the erection of additional buildings, purchase of equipment, and for working capital. The new plant will provide employment for 4,000 men.

This company, recently organized, has taken over the Lima Locomotive & Machine Co. For many years the latter company manufactured only geared locomotives, but during the past ten years steadily increased its output of railroad locomotives of all classes until further extensions have become necessary. The new corporation owns 43 acres of land at Lima, Ohio, on which there is a modern plant having a capacity of 400 engines per annum. This capacity will be increased to 900 or 1,000 locomotives a year.

Net earnings for the past seven years, after deductions for depreciation, have averaged 21/3 times the interest on the new bonds.

The directors are A. L. White, Ira P. Carnes, W. T. Agerter, G. L. Wall, O. J. Thomen (of Redmond & Co.) and Merle Middleton. The company will be under the management of the same official staff as heretofore, A. L. White, President, G. L. Wall, Vice-President, W. T. Agerter, Secretary and Treasurer, Merle Middleton, Chairman of the board.

CYCLONE PROOF CONSTRUCTION

The following letter presents a new advantage of reinforced concrete construction:—

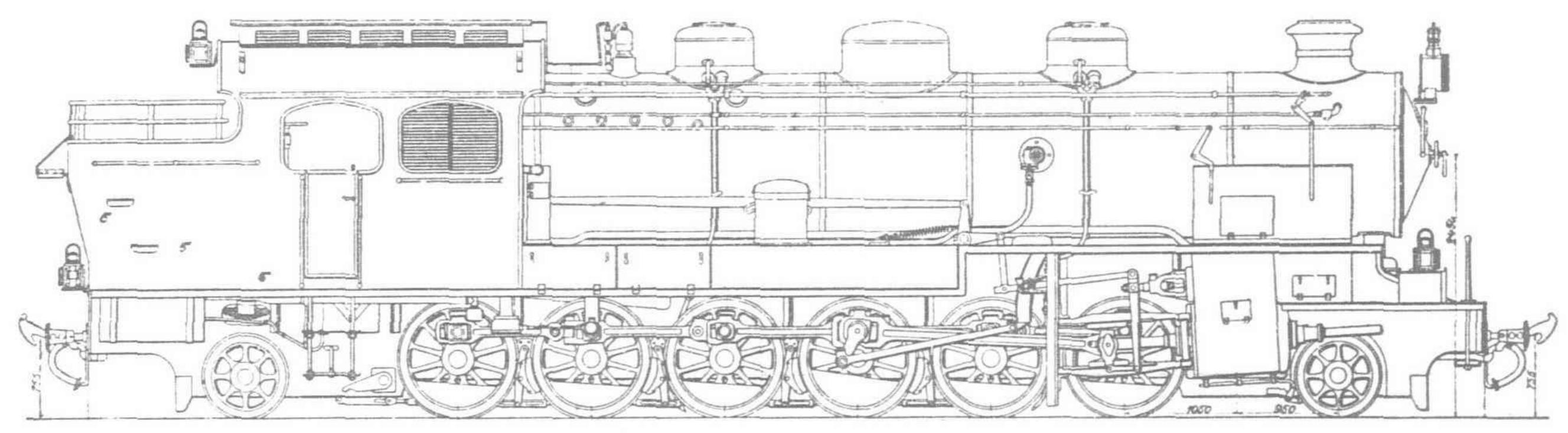
"REGINA," SASK,
July 2nd, 1912.

"The recent cyclone in Regina has shown up very plainly the advantages of Kahn System buildings, especially in the case of the Regina College, which was practically in the heart of the storm. The partitions of this building were entirely removed, but the reinforced concrete skeleton remained exactly in place. The representative of Brown and Vallance, Montreal, has written to his head office explaining this. He is particularly impressed with the fact that the Kahn System has given them a building which, in addition to being fireproof, is absolutely cyclone-proof."

Respectfully yours, "Signed R. E. W. HAGARTY."

OIL IN PAPUA

The ever growing employment of petroleum as a fuel renders the discovery of a new source of supply of world wide importance. It has long been known that petroleum was to be found in New Zealand and wells within the last few years have been brought into operation. So far however in Australia no reservoirs of any commercial value have been found (although shade oil is worked) but in the dependency of Papua (British new Guinea) an immense petroleum field was discovered in May last. An expedition was sent out by the Papuan Government to report on the Hikori-Purari coalfield. The coal proved to be of little value, but an oil-field was found of immense extent and describing as possessing big possibilities. An expert is to be sent up to the field in December to test the field. Should the discovery prove to be as valuable as the report suggests competitor to the Borneo fields may be brought into existence.



"JAVANIC" TYPE LOCOMOTIVE

"JAVANIC" TYPE LOCOMOTIVE FOR THE DUTCH STATE RAILWAYS, JAVA

BUILT BY THE HANNOVERSCHE MASCHINENBAU
A.G. (FORMERLY GEORG EGESTORFF)

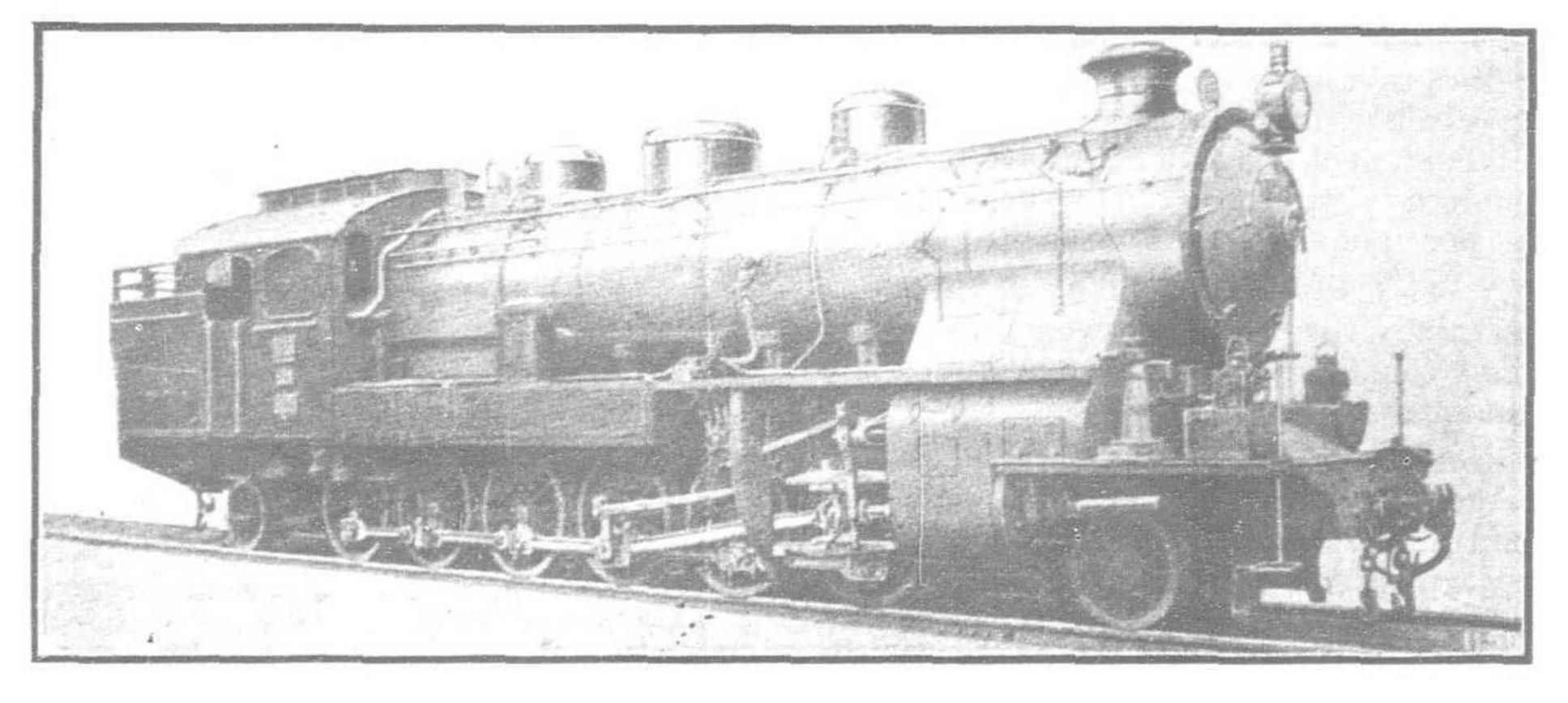
Gauge 3'6"
Diameter of cylinders 211"
Stroke of pistons
Diameter of driving wheels 3' 73"
Diameter of leading and trailing
wheels
Wheelbase 12' 35"-33' 716"
Boiler pressure 171 lbs./sq."
Grate area 28 sq. ft.
Heating surface / superh. 390 ,, ,,
measured to outside (total 1800,, "
Water capacity 1870 lmp. g.
Coal capacity 3 tons
Weight empty 127000 lbs.
Adhesive weight 125700
Weight in working order 164500 "
Firebox, copper
lron boiler tubes
Schmidt's smoke-tube superheater
Marcotty's smoke-combustion
Hardy's vacuum brake
Riggenbach's steam repression brake
Gresham's steam sanding device
Adjustable blast pipe
Haushälter's speed Indicator
Radius of sharpest curve 7 chains
Tractive force (norm.) 22050 lbs.
Code word: Javanic 27550 .,
Code word: Javanic.

The arrangement of the axles of the 2-12-2 locomotive shown in the illustration a type of engine created by the Hannover Locomotive Works for the Dutch State Railways, Java, has been designated by the name "Javanic." The facility with which this twelve coupler, the four middle axles of which have no sideplay, negotiates curves, is obtained by simple means, viz. by a leading and trailing axle of the "Adams" radial type, and by giving sideplay to the first and sixth coupled axle after the Gölsdorf system, which latter offers the following advantages over other systems for allowing locomotives easily taking curves: Maximum of simplicity; uniform, undivided

driving gear, consequently greatest security against slipping of the wheels; safe supporting of the boiler; short steam-pipe connections; simple driving gear and obviation of flexible steam pipes and of complicated articulations or cogged wheels. The wheel base is exactly symmetrical to the vertical centre plane, so that the locomotive can run equally well in both directions. The arrangement of the water tanks of the engine is also worthy of attention, in as much as they are opposed to the usual tanks placed at both sides of the boiler, placed between the frame plates and project at the sides beyond the latter, thus having a T-shaped cross section. This arrangement is particularly important in that it enables the side-sheet-stays to be readily got at at all times, and insures the accessibility of all parts of the boiler, so that it could be placed relatively high above the top of the rails, without the centre of gravity of the whole locomotive being raised. The elimination of the water tanks at the sides of the boiler is also of importance, in as much as the driver has thus an unimpeded view along the line in front of him.

AGRICULTURAL MACHINERY

Siberia, a Market.—According to the Peking and Tientsin Times there is "a great market in Siberia for agricultural machinery of a type that answers local requirements... The pushful and enterprising American has managed to capture the cream of the market. There is a quick and ready market to supply horse ploughs for two, three, four, and six horses. Also for traction ploughs capable of being worked by the crude oils of the country... The local conditions for payments for machinery for agricultural purposes are one-third cash down, onethird during the following Autumn, and the remainder during the Autumn of the ensuing year... All unpaid balances bear interest at the rate of eight per cent, which is certainly favorable to the supplier of the goods. Owing to climatic conditions, there is occasional failure of the harvest, as in Canada and other parts, so that undue pressure is inadvisable from the point of view of steady and permanent trade."



"JAVANIC" TYPE LOCOMOTIVE

NEW JAPANESE ENTERPRISES

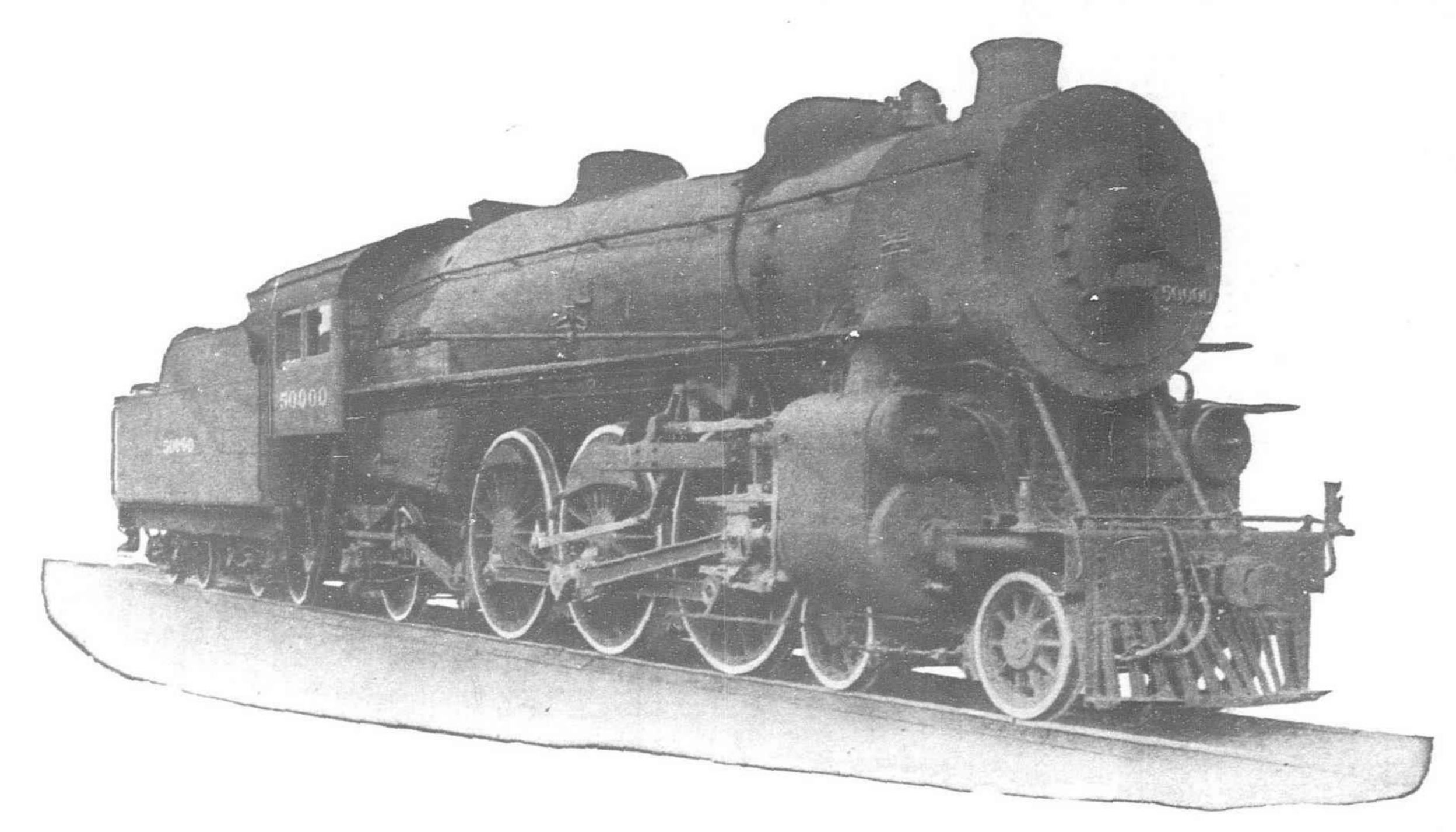
According to the latest investigations of the Department of Agriculture and Commerce of Japan, the number of business companies inaugurated during the month of July and their capital and denominations are as follows:

I N	Number. Capital. Yen
Agricultural Companies	
Fishery Companies	
Brewery Companies	
Provision Factories	- 10 52,810
Weaving Industry	- 32 2,164,650
Chemical Engineering	
Pottery Factories	
Metal works	
Machine factories	
Gas and Electric Companies	- 10 1,613,000
Miscellaneous Engineering	
Mining Company	- I 300,000
Sales Companies	
Godown Companies	
Banks	
Trust Companies	- 14 178,000
Insurance Company	- I 500,000
Miscellaneous Companies	
Transport Companies	
Total	- 319 9,809,581

TO DEVELOP INDO-CHINA

M. Albert Metin's report to the French Chamber on the ninety-million-franc loan solicited by French Indo-China is now available. It has been made in the name of the committee for Foreign Affairs. A part of this loan (f.26,000,000 in the Government project) is destined to cover the excess sums spent in executing the programme of the 1898 loan of f.200,000,000. The reporter points out that this earlier programme was based on insufficient studies, and expresses the desire that similar blunders may be avoided in future. Profiting from the fact that the loan of f.200,000,000 has not been completely realised, he here reduces the deficit to be covered from f.26,000,000 to f.23,400,000. As regards the balance of f.66,600,000 to railways M. Metin proposes to devote nearly f.29,000,000 to finish two lines of the former programme—the line from Hanoi to the frontier of China, and that from the delta of Tong-King to Hue. At the head of the new lines is that which will join Cochin-China to the new provinces of Cambodia Battambang. The reporter regrets that the construction of the branch line from Tourane to Savannaket cannot be immediately undertaken, though it is indispensable to the penetration of Laos, and says the construction of a road must provisionally satisfy. The irrigation works in Middle Tonking and in Annam will absorb f.10,000,000. M. Metin likewise approves the appropriation of a sum of f.3,000,000 for the building of Franco-native schools, which will permit in particular the development of professional education. We may note that f.600,000 will be used to establish a central station of wireless telegraphy at Saigon. Finally, in view of the variable character of Indo-Chinese receipts, comes the important recommendation that the French State should guarantee the loan. and that the military contribution of the colony should be reduced by f.3,500,000. M. Metin advises, further, a policy of economies, as he had done in his preceding report on the Budget of Indo-China.—Exchange.

THE 50,000TH LOCOMOTIVE OF THE AMERICAN LOCOMOTIVE COMPANY



EXPERIMENTAL PACIFIC TYPE LOCOMOTIVE NO. 50,000. BUILT BY THE AMERICAN LOCOMOTIVE COMPANY. DESIGNED TO PROVIDE THE MAXIMUM POWER PER POUND OF WEIGHT. IN ACTUAL SERVICE THIS LOCOMOTIVE HAS DEVELOPED

H.P. FOR EACH 121.4 LBS. OF ITS TOTAL WEIGHT

An experimental Pacific type locomotive designed to provide the maximum power per pound of weight. Has developed in actual service I H.P. for each 124.4 lbs. Total Weight.

In an effort to determine the extent to which the efficiency and capacity of a passenger locomotive of approved wheel arrangement could be developed without exceeding the existing Permanent Way limitations of the standard railways, the American Locomotive Company have recently designed and constructed, at their own expense and as an experiment, a heavy Pacific type passenger locomotive, the performance of which promises to mark an epoch in the history of locomotive construction. This locomotive, which is illustrated herewith, was developed in consequence of the thoroughly appreciated need of greater sustained capacity to meet the maximum requirements of modern passenger service and while the great power obtainable will not be demanded by Far Eastern railroads for some time to come, the refinement of design has brought out many interesting details which can be incorporated in lighter locomotives with the result that their efficiency will be greatly increased. It is to be expected that the great advancement in locomotive engineering typified by this design will be appreciated by engineers the world over and we accordingly welcome the opportunity to place before our readers a few of the details of design which have caused this locomotive to excite so much comment in American railway circles.

Untrammelled by any outside specification or the necessity of conforming to any railroad's existing standards, the builders had a free hand to embody in this design their idea of the best locomotive engineering practice. The fullest application of approved developments in locomotive design and materials was the means employed for the accomplishment of the object in view and the latest knowledge of general proportions, the recent developments in the manufacture of materials, refinement in the design of details, all were combined in order that the utmost possible economy in operation might be secured. To accomplish the purpose of the design the maximum capacity per pound of weight the largest boiler capacity within pre-determined wheel loads was the essential teature and with this end in view, every pound of weight in all of the parts that was not essential to strength or durability, was eliminated and the weight thus saved utilized in the provision for a larger boiler.

The following comparison of locomotive No. 50,000 with other leading examples of Pacific type locomotives of approximately equal weights shows strikingly the larger boiler provided in the former in proportion to its weight.

Total weight of locomotive	50,000 1bs 269,000	A. 1bs 269,000	B. 1bs 271,000	C. 1bs 270, 00	D. 1bs 266,500
Type of boiler	Conical connect.	Conical connect.	Conical connect.	Straight	Conical connect.
Outside diameter at front end Largest diameter Firebox length Firebox width Tubes number Tubes number Tubes, diameter Flues, diameter	763'' 87'' 114'' 754'' 207 36	72" 83" 1051" 751" 175 32 21" 51"	72" 83" 1081" 754" 242 28 2" 53"	793" 834" 111" 804" 343	72" 83" 1081" 754" 38
Tubes, length	22 ft.	6 in.	6 in.	21 ft.	20 ft.
Heating surface, total Superheating	4048	sq. ft. 34 ² 4	sq. ft. 3784	sq. ft 4427	sq. ft. 4210
Grate area	897 59.75 ft.	765 56.5 ft	705 56 5 ft	. 61.8 ft.	. 56.3 ft.

In the larger boiler thus secured, the utmost care was taken to embody the best proportions and the most carefully designed details. Approved fuel saving devices, the superheater and brick arch, were applied and moderate steam pressure with cylinders carefully proportioned to the boiler so as to give the most economical point of cut-off at the maximum boiler capacity, used. It will be noted that the boiler of locomotive No. 50.000 has 624 and 264 more square feet of evaporative heating surface combined with from 132 to 192 more square feet of superheating surface than the other two superheater locomotives respectively, both of the which are of equal or greater weight. Compared with the two locomotives not equipped with superheater, the locomotive has at the most only 379 square feet of direct evaporating surface less, which is undoubtedly three or four times offset by the economy secured with the 879 square feet of superheating surface. This is the largest amount of superheating surface provided in an American passenger locomotive up to the present time and has resulted in realizing greater economy in operation due to the greater degree of superheat attained. Compared with another locomotive equal weight also equipped with superheater, but of less superheating surface and giving an average of 63 degrees less superheat, No. 50,000 has shown in service tests an average greater economy of 13 per cent in fuel and 14 per cent in water consumption per indicated horse power hour.

The superheater is of the Schmidt design, type "A," and consists of 36 5½-inch flues each of which in turn contains four 1½ inch seamless steel units. A damper of the usual design is provided which automatically regulates the flow of gases through the superheater flues when the throttle is opened and closed. In the tests, the maximum superheat obtained reached 341 degrees whereas the average amounted to 276 degrees.

To further increase the boiler capacity through improved economy, the firebox is equipped with a "Security" sectional brick arch. This type of arch in which the brick rest on water tubes, is rapidly replacing the old bracket or stud supported arch, its two cardinal features being that the circulation of water in the legs of the boiler is greatly facilitated by the arch tubes and that the brick are easily removed and replaced whenever tube inspection becomes necessary. Applications of this arch have frequently resulted in increases of boiler capacity of as much as ten per cent.

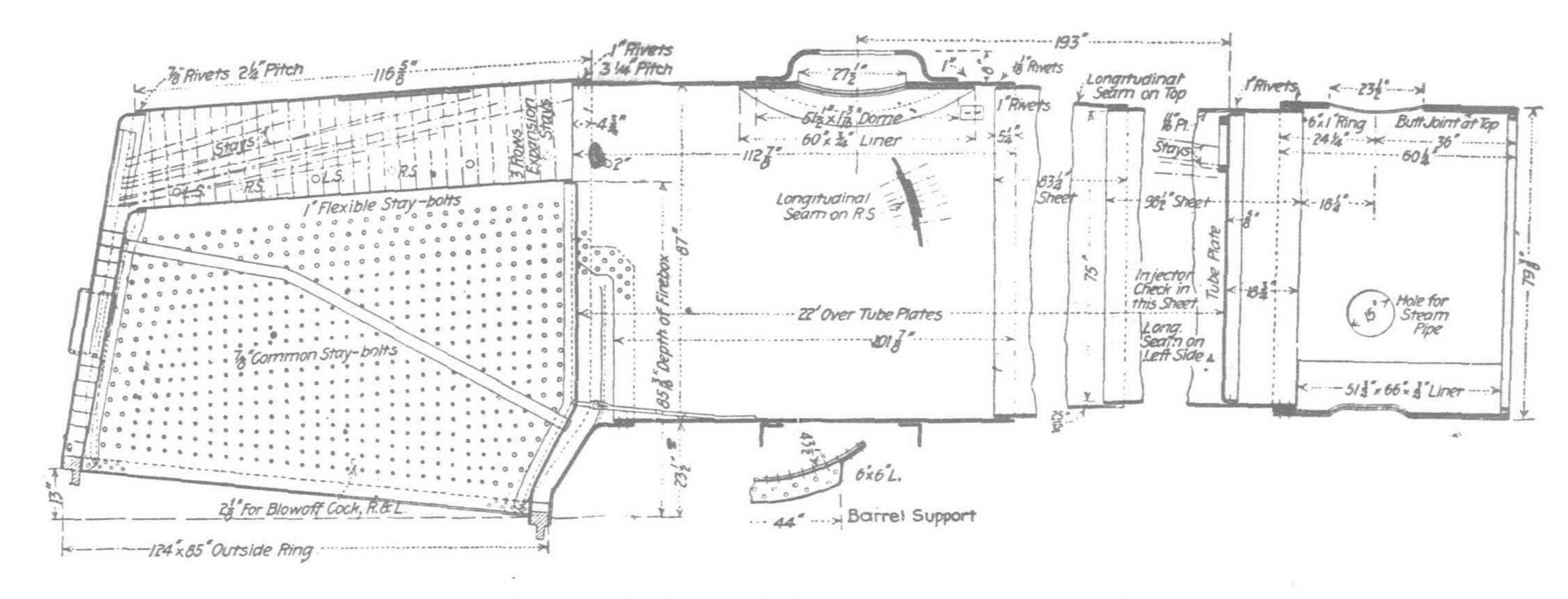
Aside from this large boiler capacity a number of new features have been introduced with the object in view of saving in weight and securing improved economy in operation. Among these the most important are the following:—

Cast steel cylinders with cast iron bushings. Steam pipes arranged to connect with the cylinders outside of smoke box.

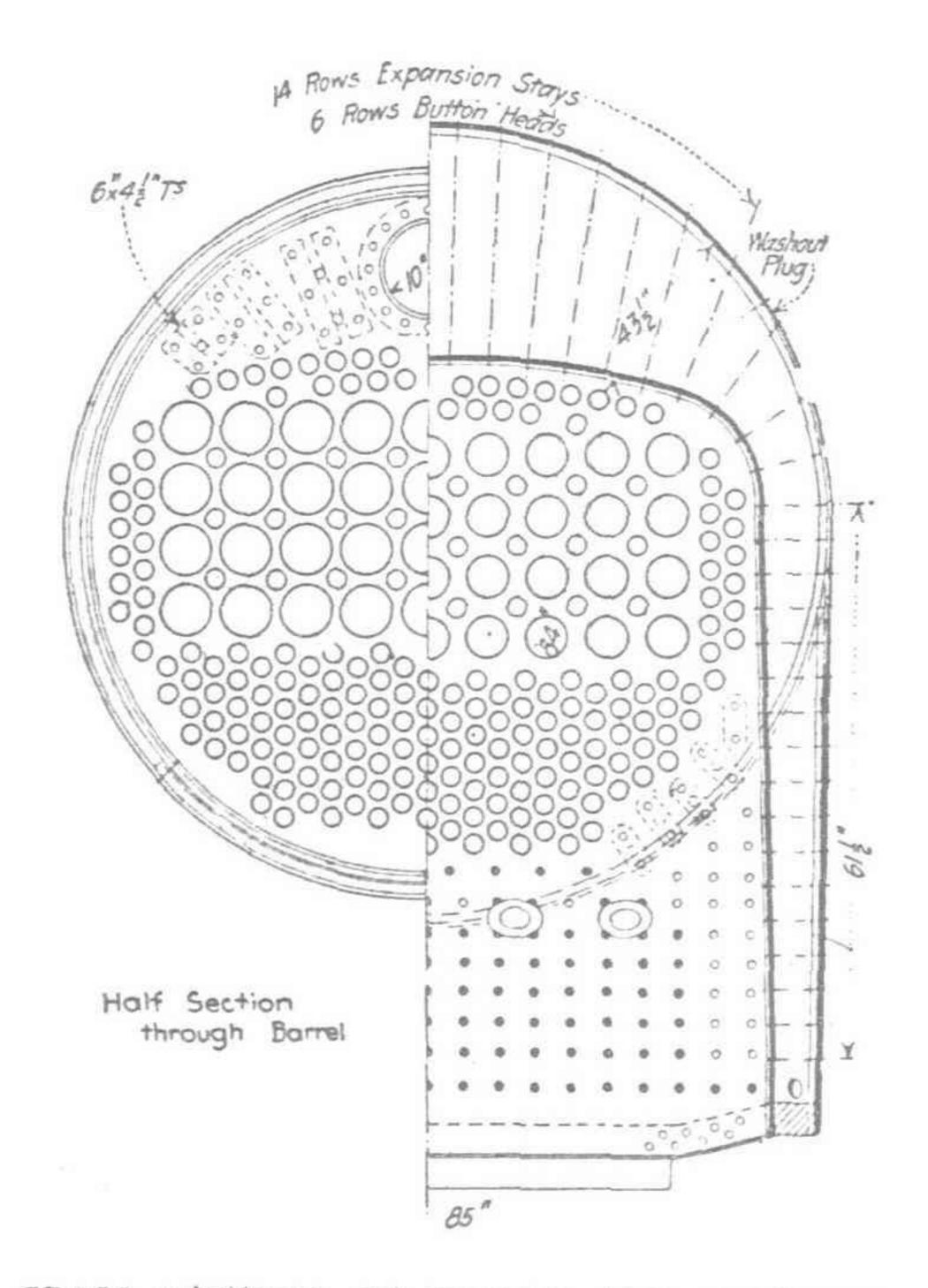
Screw reverse gear.
A self-centering device for the valve stem.
A new arrangement of guide for the extended

Improved outside bearing radial truck.

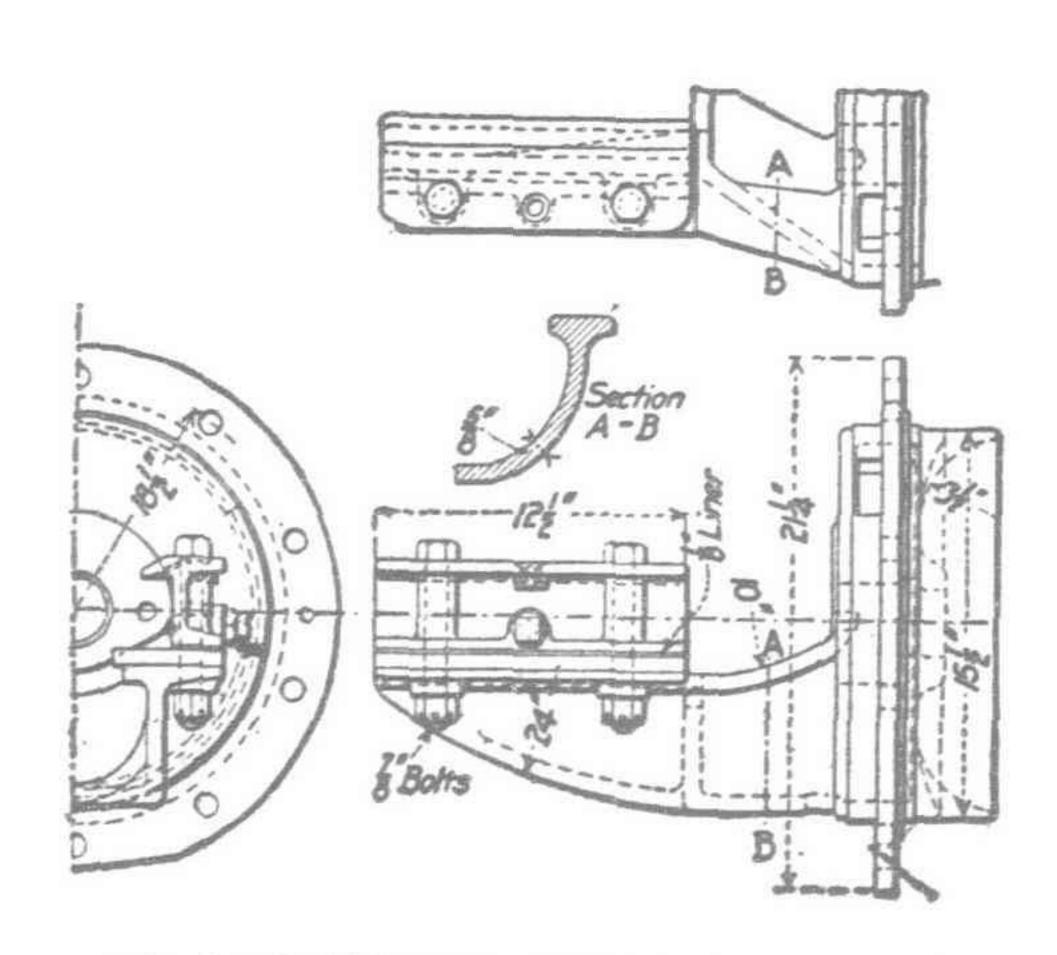
Most of these features, modified somewhat in structural details, have since been adopted into the Builder's regular practice and have been extensively used on locomotives since built by them. These are shown in detail in their latest form by the accompanying illustrations, an inspection of which will at once make it clear that the fundamental improvements while originally



BOILER AND FIREBOX OF EXPERIMENTAL LOCOMOTIVE

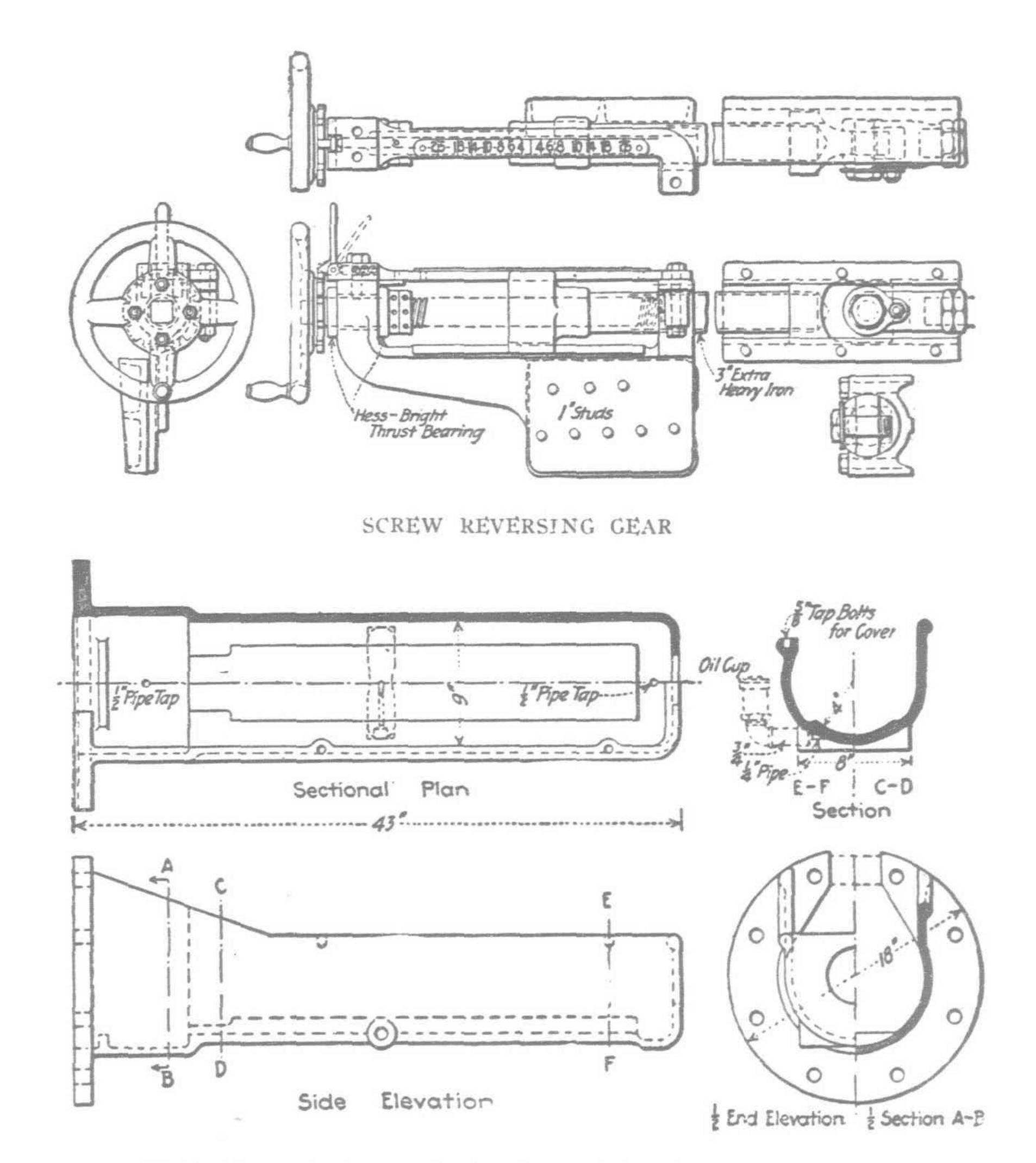


CROSS SECTION OF BOILER AND FIREBOX, SHOWING THE SUPERHEATING TUBES



SELF-CENTERING GUIDE FOR VALVE
STEAM (CAST ON THE BACK HEAD
OF THE VALVE CHAMBER

worked out in connection with a heavy locomotive, are equally applicable to the lighter designs of equipment now in use on the Eastern railroads.



SELF-CENTERING GUIDE FOR THE EXTENDED PISTON ROD.

(BOLTED TO THE FRONT CYLINDER HEAD)

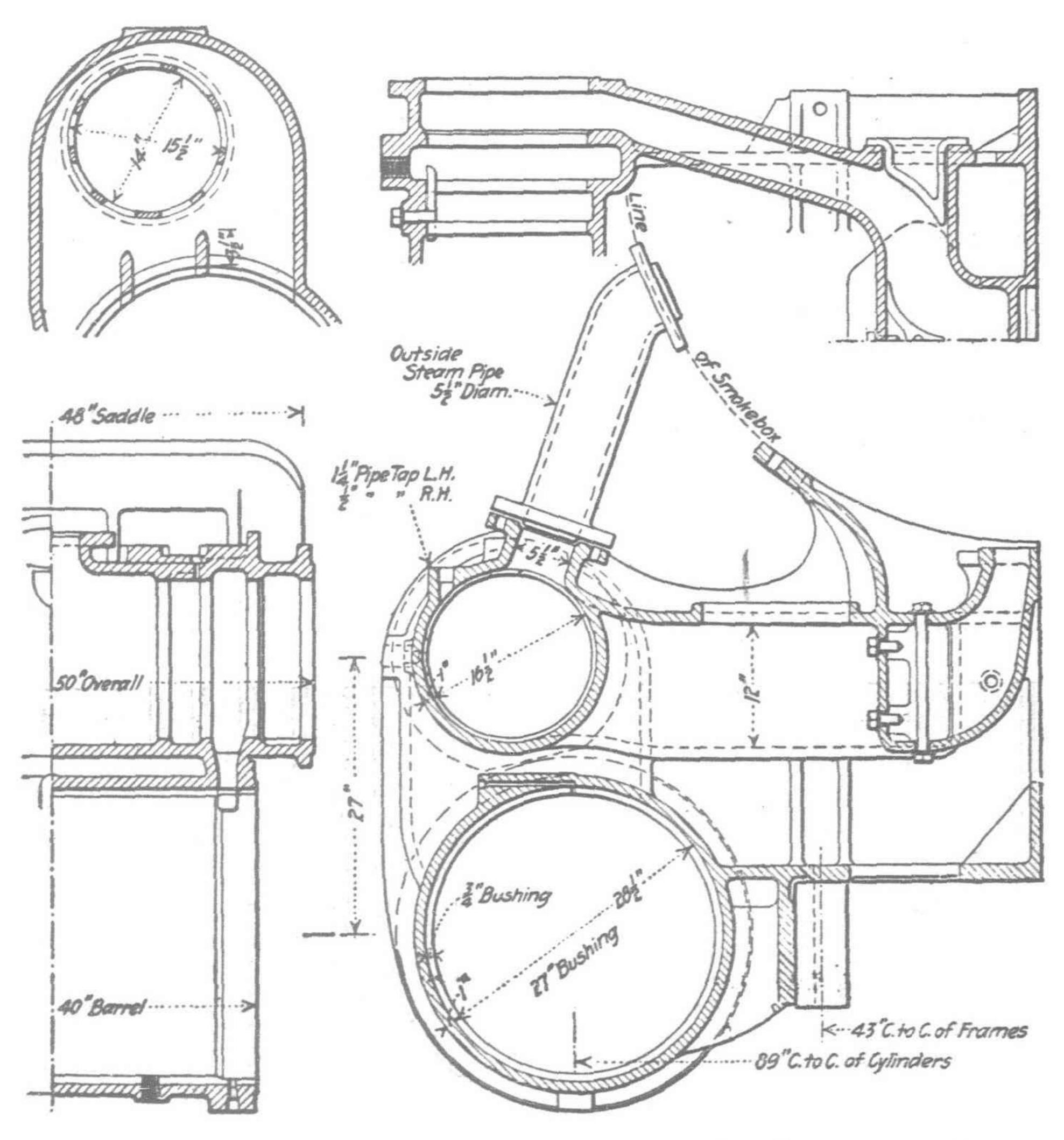
CAST STEEL CYLINDERS.

This is the first instance of the use of cylinders of this construction in American locomotive practice and constitutes one of the most radical departures from conventional practice that is to be found in the design. Vanadium steel was employed for the main castings, cast iron being used for the bushings alone, and as a result the 27 × 28 inch cylinders with which this locomotive is equipped, weigh 2,660 pounds less than cast iron cylinders of ordinary construction having but a 22 inch stroke and approximately 4,000 pounds less than inside steam pipe cylinders of equal dimensions.

OUTSIDE STEAM PIPES.

The arrangement employed was really necessitated because of the use of cast steel for the cylinder castings, this metal making it very essential that the design be such as to result in as simple as possible a casting. Because of its many advantages among which mention may well be made of the following, the outside steam pipe construction is being received most favorably among railway operating officials.

Advantages of the outside steam pipe design:— The elimination of the central live steam passages in the cylinder saddle thus resulting in a more direct passage of the steam from dry pipe to steam chest.



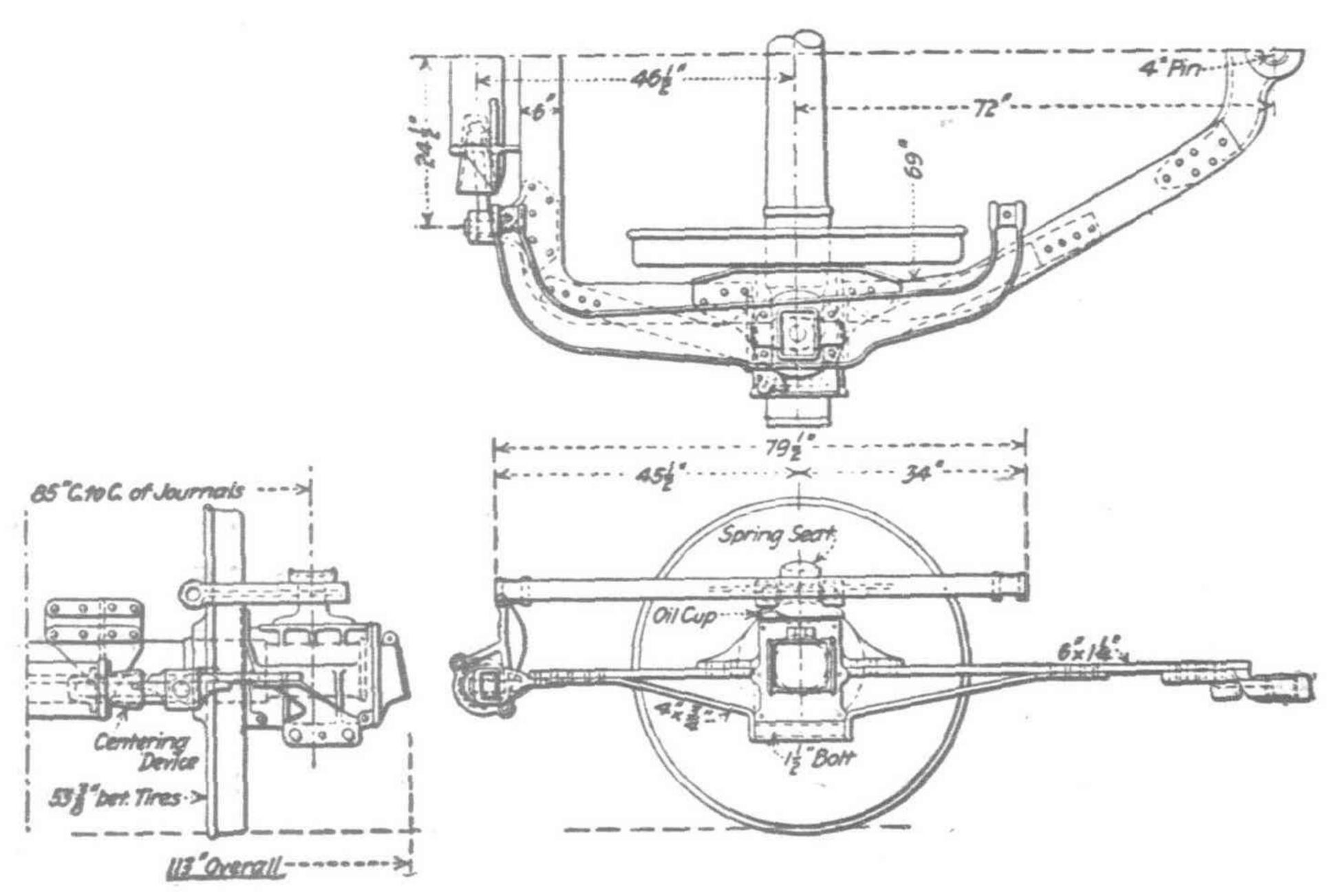
CAST STEEL CYLINDERS AND SADDLE WITH OUTSIDE STEAM PIPES.

(THE OUTSIDE STEAM PIPES ENABLE THE SADDLE DESIGN

TO BE MADE MUCH MORE SIMPLE THAN WHEN

STEAM PASSAGES ARE FORMED IN IT

IN THE USUAL MANNER)



REAR TRUCK OF OUTSIDE-BEARING RADIAL TYPE FOR THE EXPERIMENTAL LOCOMOTIVE OF THE AMERICAN LOCOMOTIVE COMPANY

Improved steaming capacity of boiler because it removes much of the obstruction to draft in the smoke box which is present with steam pipes of the conventional design.

A much better joint with cylinders is also provided by the 8 bolts of equal length with the symmetrical flange, in place of the usual 4 or 6

bolt and style of flange adapted to the best inside steam pipes. Should a small leak occur at the cylinder joint it has no injurious effect on the steaming of the engine, merely wasting steam but not interfering with the vacuum in the smoke box as in the case of a similar leak with the ordinary inside pipe construction.

It is also probable that the elimination of the live steam passages in the cylinder saddle will tend to minimize the loss of cylinders from cracking in service.

SCREW REVERSE GEAR.

The screw reverse gear can be easily arranged to give about eleven times the leverage obtained with the reverse lever as ordinarily proportioned and as a result the locomotive can be handled with greater ease. With the lever and quadrant arrangement usually employed considerable loss in economy and efficiency in operation ensues from the fact that steam is not used expansively with full throttle and cut-off arranged at the most economical point, due to the fact that when a high speed has been attained it is often a risk to change the reverse lever because of the liability of the lever getting out of the hands of the engineer. The wheel can be spun around very rapidly so that only from four to six seconds are required to completely reverse the engine. The American Locomotive Co's., design of this gear differs from that heretofore used in that it has a ball thrust bearing and is so arranged as to provide a straight line pull with the resultant elimination of the bending strains usually found in the ordinary gears.

SELF-CENTERING VALVE STEM GUIDE.

Another important improvement in detail design is the self-centering guide for the valve stem, a device which consists of a guide made integral with the back head of the piston valve chamber and so constructed as to be easily adjusted for wear. The chief advantage of this arrangement is that it can be erected, taken down, and replaced without lining up, at the same time insuring that the valve stem guide is absolutely in line with the piston valve chamber. It permits of the use of a straight design of combination lever without forks, is self-supporting so that no bracing from the guides or any source other than the cylinders is required, and affords greater lateral stability than is obtained in other designs.

SELF-CENTERING EXTENDED PISTON ROD GUIDE.

This device, like the valve stem guide, is selfcentering and can be removed and replaced in position without lining up and at the same time exactly coincides with the longitudinal axis of the cylinder. It consists simply of a shoe fitted to the extended end of the piston rod and composed of a cast steel body with a cast iron wearing block firmly secured to it by four bolts. The shoe slides on a guide fastened to the cylinder head and the circular face of the guide registers with a corresponding face on the front head. The guide surface is struck from the center of the cylinder and the guide so constructed that it can be bored out and faced off at one setting of the machine. The bearing surface of the shoe and guide are made radial so as to provide sufficient wearing surface for two or three years without requiring adjustment of linings or repairs of any kind. Furthermore, the guide surface being concentric with the center of the cylinder, any refinement in adjustment between the shoe on the front of the rod and the main crosshead, is unnecessary, since while the crosshead works on a flat guide, the piston rod shoe will swing around the center of the cylinder and thus always take a fair bearing without cramping.

IMPROVED OUTSIDE BEARING RADIAL TRUCK.

Through the use of the American Locomotive Co.'s improved design of outside bearing radial truck a saving in weight of over 5,000 pounds was effected, this being possible as a result of the mission of the heavy slabbed frame sections of the ordinary design. This truck has greatly improved the riding qualities of the locomotive as a result of a provision which has been made for a universal adjustment of the springs; to the rise and fall action of the spring centering device; and the inclined friction plates which operate to restore the truck to its normal central position on entering a tangent after passing through a curve. Moreover, all spring seats being in compression, any wear and lost motion which may accumulate is automatically taken up, the design thus being an improvement from the maintenance standpoint.

PRESSED STEEL BUMPER AND PILOT.

Further evidence of the refinement in detall carried out in this locomotive to keep the weight of every part to a minimum consistent with proper strength, is furnished by the use of a pressed steel bumper and pilot such as has heretofore been successfully employed on the Lake Shore and Michigan Southern Railway. Compared with the ordinary design of cast steel bumper the pressed steel type weighs approximately 1,200 pounds less, while as between the pressed steel and wooden pilot there is a difference of 350 pounds, a total saving of 1,500 pounds being effected in these two details alone.

VANADIUM STEEL.

Additional strength without increased weight is secured by the liberal use throughout the design of vanadium steel for many of the principal parts. Some of the details constructed of this alloy are; driving wheel centers, frames, rods, piston rods, valve motion work, springs, crank pins and cylinders.

Locomotive No. 50,000 sets a new high mark for the capacity and economy attainable within

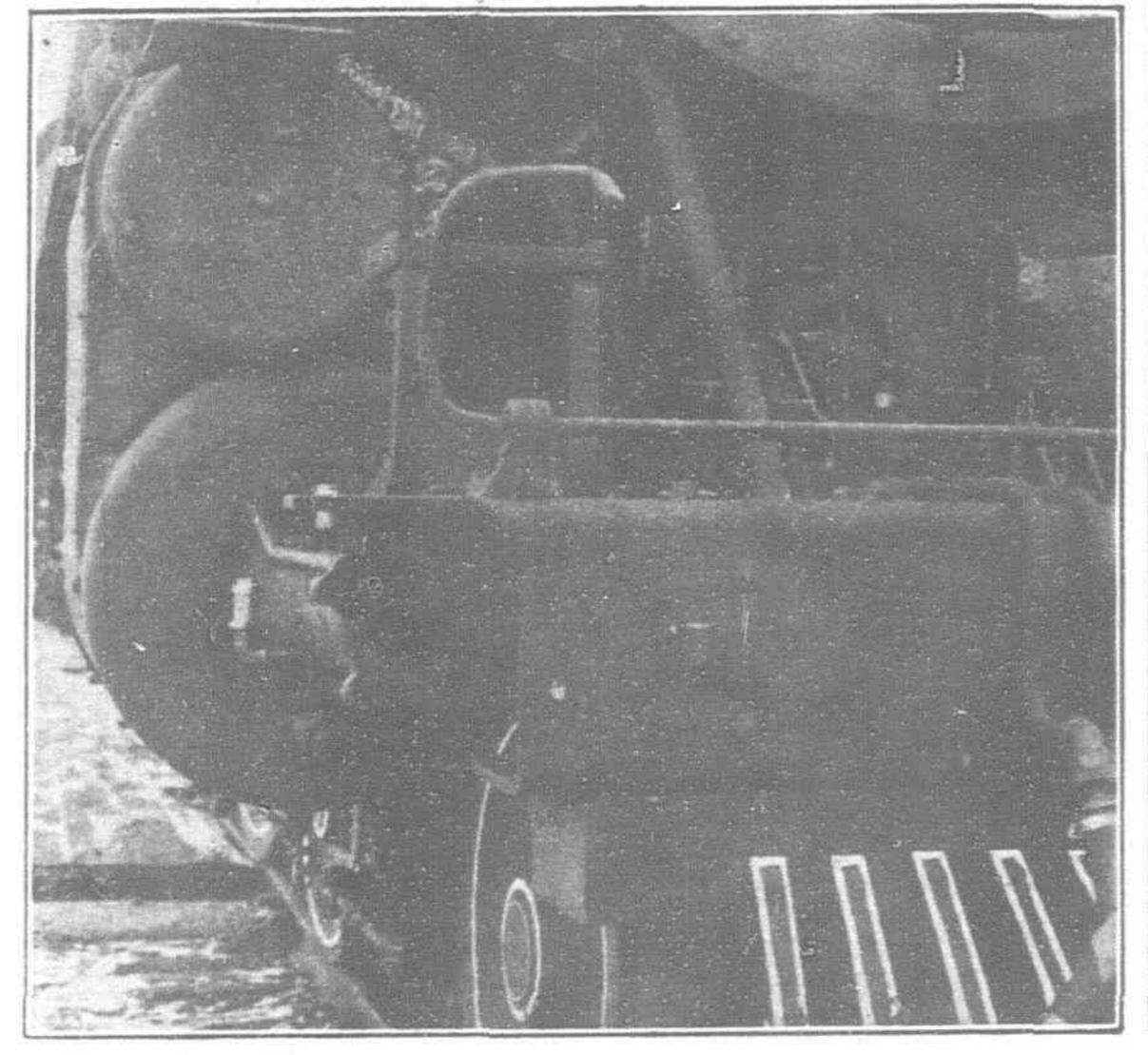
Firebox heating surface total heating surface*, per cent . 4.60		
Weight on drivers: total heating surface*		
Volume of both cylinders, cu. ft. 18.60 *Total heating surface cylinder		
volume		
CYLINDERS.		
Kind Simple Diameter and stroke 27 in. ×	28	in.
VALVES.		
Kind		
Forward 1/8 in. Backward	1/2	in.

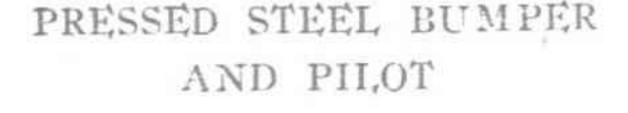
WHEELS.

Driving,	diameter	over tires,	 79 ins.
		of tires	 31/2 ins.

INDIA'S NEW CAPITAL

The Government of India has decided to invite architects and others residing in India to submit competitive designs for the residences of various grades of officials at Delhi. A notification, calling for the submission of designs, will shortly be issued. A committee, assisted by the Consulting Architect to the Government of India, will examine the designs and liberal premiums will be awarded to successful competitors. One of the conditions of the competition will be that the competitor should certify that his designs and drawings were prepared in India by him or under his direct supervision. The drawings will be publicly exhibited after the committee have made their award. It is hoped by the early construction of a number of permanent residences on designs selected from this competition, to reduce expenditure on the provision of temporary quarters. As the detailed plan of the laying out of the new capital has not yet been prepared the location and general arrangements of the principal public buildings have not yet been fixed. Until this has been done, no arrange-





the limitations of conservative wheel loads in a modern passenger locomotive designed for sustained high speed service with heavy loads. It has also pointed out a way by which present practice may be greatly improved by better proportion of boiler to engine capacity, greater refinement in the design of details, the best use of fuel saving devices the value of which have been tried and proved in service, and the use of the most up-to-date materials. For these reasons this locomotive merits investigation and the most careful study of all the details of its design on the part of all railroad officials interested in locomotive operation.

The general dimensions, weights and ratios are given in the following table:-

		1000
CEN	ERAL	DATA.

GENERAL DATA.	
Gauge	4 ft. 8½ Passenger
Service	
Fuel	Bit. coal.
Tractive effort	40,800 IDS.
Weight in working order	269,000 lbs.
Weight on drivers	172,500 lbs.
Weight of engine and tender in	
working order	430,500 lbs.
Wheel base, driving	14 ft.
Wheel base, total	35 ft. 7 ins.
Wheel base, engine and tender	08 It. 21/2"
DATIOS	

	RATI	05.		
Weight on drivers Total weight:trac	tive ef	ffort		6.68
Tractive effort Xd	am.	of d	rivers	
-heating surf	ace			590.00
*Total heating surf	ace ÷	grate	area	90.50

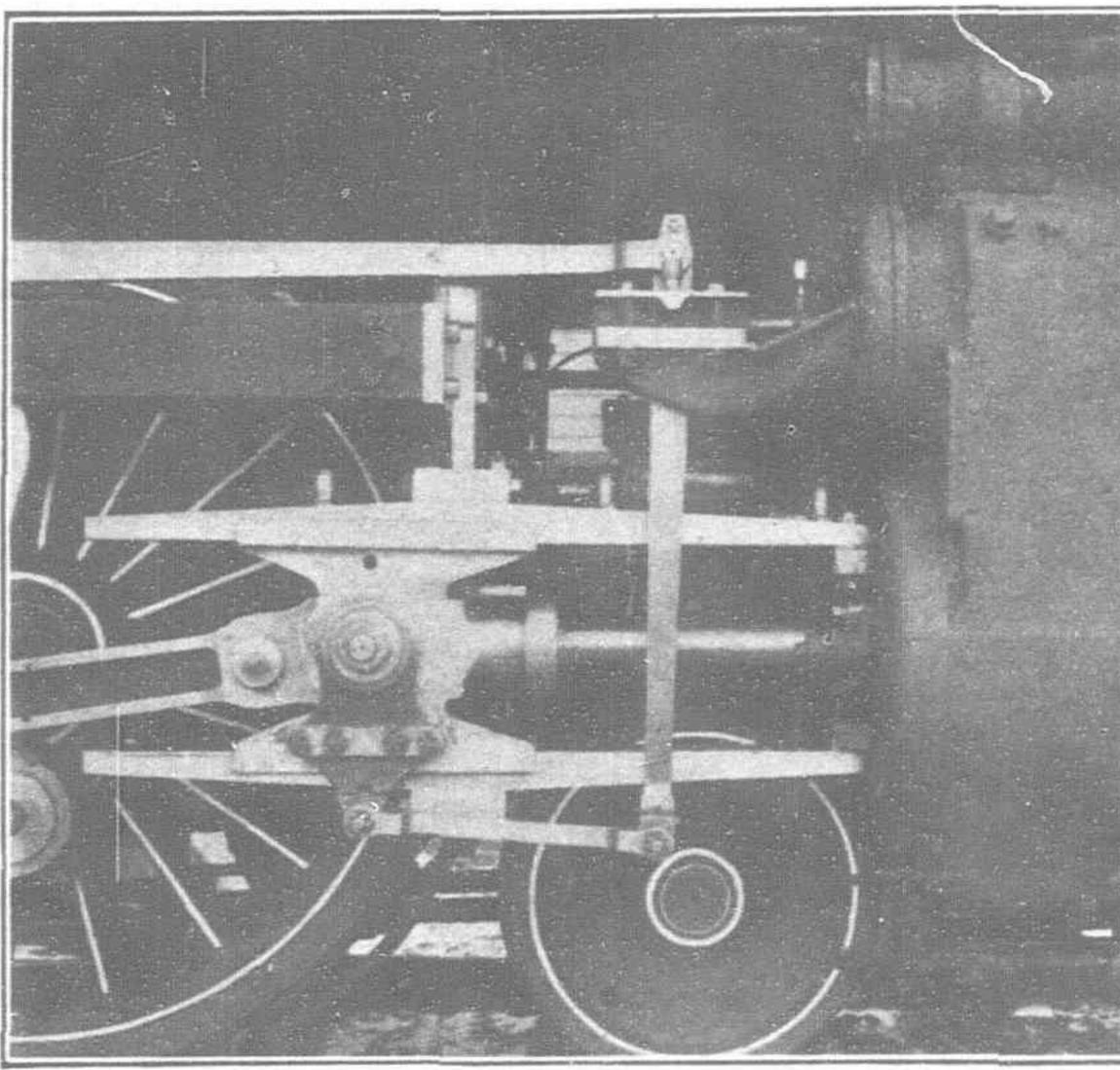
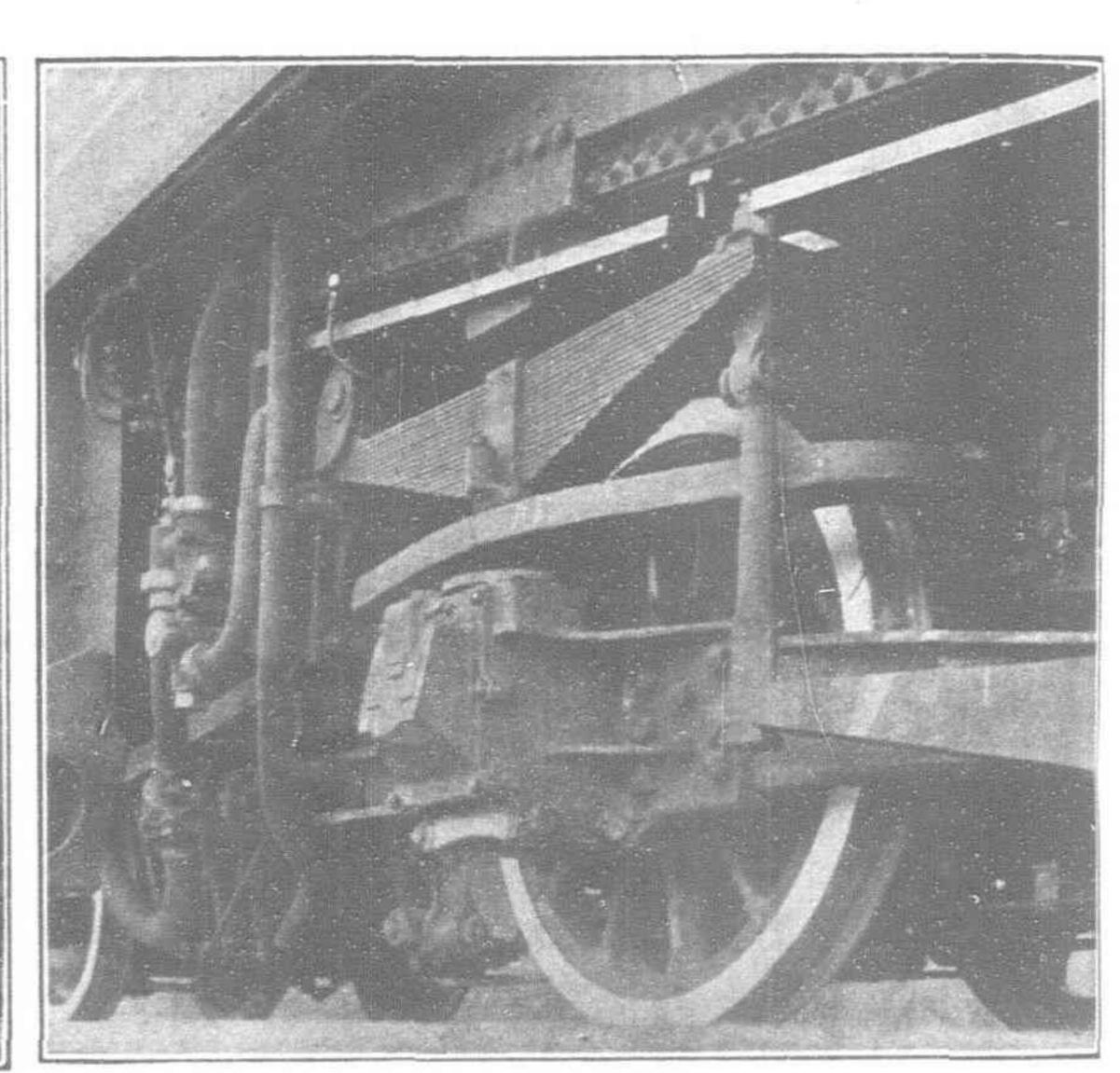


ILLUSTRATION SHOWING PORTION OF MOTION WORK AND VALVE STEAM ENTERING DEVICE

Driving journals, main, diam. and length
BOILER.
Style Conical. Working pressure 185 lbs. Outside diameter of first ring 76% in. Firebox, length and width 114½ × 75 in. Firebox plates, thickness 3% × ½ in. Firebox, water space 4½ in. Tubes, number and diam. 207—2¼ in. Tubes, superheater 36—5½. Tubes, length 22 ft. Heating surface, tubes 3,800 sq. ft. Heating surface, firebox 248 sq. ft. Heating surface, total 4,048 sq. ft. Superheater surface 897 sq. ft. Grate area 59¾ sq. ft. Smokestack, height above rail 14 ft. 7% in. Center of boiler above rail 9 it. 11 in.
TENDER.
Tank style

^{*} Equivalent heating surface equals 5,394 sq. ft.



AMERICAN LOCOMOTIVE COMPANY'S IMPROVED TYPE OF TRAILING TRUCK. NOTE ABSENCE OF USUAL DOUBLE SLABBED FRAME SECTIONS

ments can be made with regard to the designs for offices and other large buildings. The Government, however, hope before long to be in a position to call for competitive designs for certain public offices and other buildings.

REVIEW

KNOTS, SPLICES AND ROPE

BY A. HYATT VERRILL 128 (5 X 7) PAGES, 150 ORIGINAL ENGRAVINGS, PRICE GOC.

This is a practical book, giving complete and simple directions for making all the most useful and ornamental knots in common use, with chapters on Splicing, Pointing, Seizing, Serving, ctc. This book is fully illustrated with 150 original engravings, which show how each knot, tie or splice is formed and its appearance when finished. The book will be found of the greatest value to Campers, Yachtsmen, Travellers, Boy Scouts, in fact to everyone having to use or handle ropes for any purpose.

The book is thoroughly reliable and practical and is not only a guide but a teacher. It is the standard work on the subject.

The Norman W. Henley Publishing Co., 132 Nassau Street, New York.

RUBBER-GROWING INDUSTRY OF THE PHILIPPINE ISLANDS

In a communication directed to the Secretary of the Manila Merchants' Association, the Hon. Dean C. Worcester, Secretary of the Interior, gives the following authoritative and official information on Rubber Growing in the

Philippines.

SIR: Referring to your letter requesting information relative to the rubber-growing industry in these islands, I have the honour to inform you that copies of it were forwarded to the Director of the Bureau of Science, the Director of the Bureau of Agriculture, and

METHOD OF TAPPING A PARA RUBBER TREE THIRD DAY AFTER TAPPING, BUITENZORG, JAVA

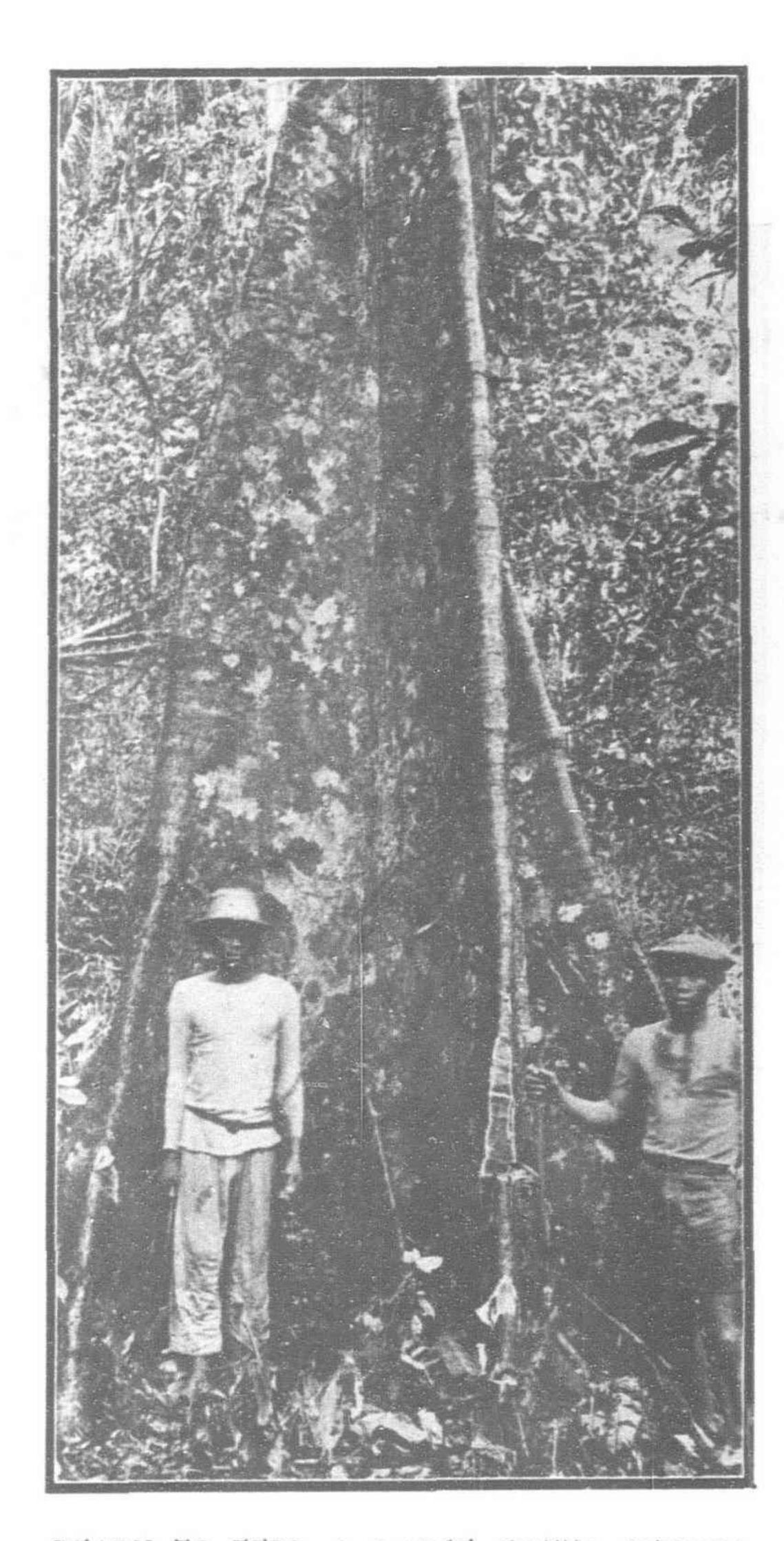
the Director of the Bureau of Forestry, and that each of those officials was requested to furnish such information as was in his power to give.

The Director of the Bureau of Agriculture sent out thirty-two letters to rubber planters in the Moro Province, requesting information based on their practical experience. Up to July 7 but one reply was received and so far as I am aware no others have since come in.

My own absence on my long annual inspection trips prevented me replying sooner to your inquiry. As you are aware, I addressed a letter to you under date of July 7, 1910, embodying all the information which I had been able to gather up to that date, but as it seemed probable that I might obtain more reliable information relative to the cost of

clearing the land and planting it, and relative to the returns which might be received from catch crops, I have delayed forwarding this letter until the present time.

I knew that I could obtain especially reliable information relative to the cost of bringing . land under cultivation from Mr. C. H. Lamb, Superintendent of the Iwahig Penal Colony. As you know, the land under cultivation by the convicts at this Colony has for the most part been made available by clearing away the virgin forest and as a strict account of all labor used is kept, Mr. Lamb's figures should be rather trustworthy. They were received just prior to my departure from Manila.



READY TO FELL A LARGE GUTTA PERCHA TREE FOR EXPERIMENTAL PURPOSES, ZAMBOANGA, P. I.

LAND LAWS.

As you yourself are doubtless aware, no corporation authorized to engage in agriculture may own or control more than 2,500 acres of land. There is no restriction as to the amount of land which an individual may lawfully own, but there is a restriction on the amount of public land which he may purchase, which may not exceed 40 acres. A corporation may purchase not to exceed 2,500 acres of public land. The minimum price which may be charged for such land is P10 per hectare, and where the land in question is wild and uncultivated it is our custom to charge this minimum price. The provisions of existing law relative to the rental of public lands are more liberal than are those relative to their sale. Either an individual or a corporation may rent not to exceed 2,500 acres. Leases run for 25 years

with the privilege of renewal at the end of this period for an additional 25 years. The rental price cannot be less than 50 centavos per hectare (approximately 10 cents, gold, per acre) during the first 25-year period, nor more than P1.50 (approximately 30 cents, gold, per acre) per hectare during the second 25-year period. It is our custom to charge the minimum price when wild land is taken up as we are very desirous of seeing some part of the enormous area of rich agricultural public lands in the islands brought under cultivation.



A RUBBER VINE, WESTERN MINDORO

If the product from 2,500 acres would not be sufficient, several individuals could rent 2,500 acres each and make such 'arrangement relative to the sale of their products as might seem advantageous to them.

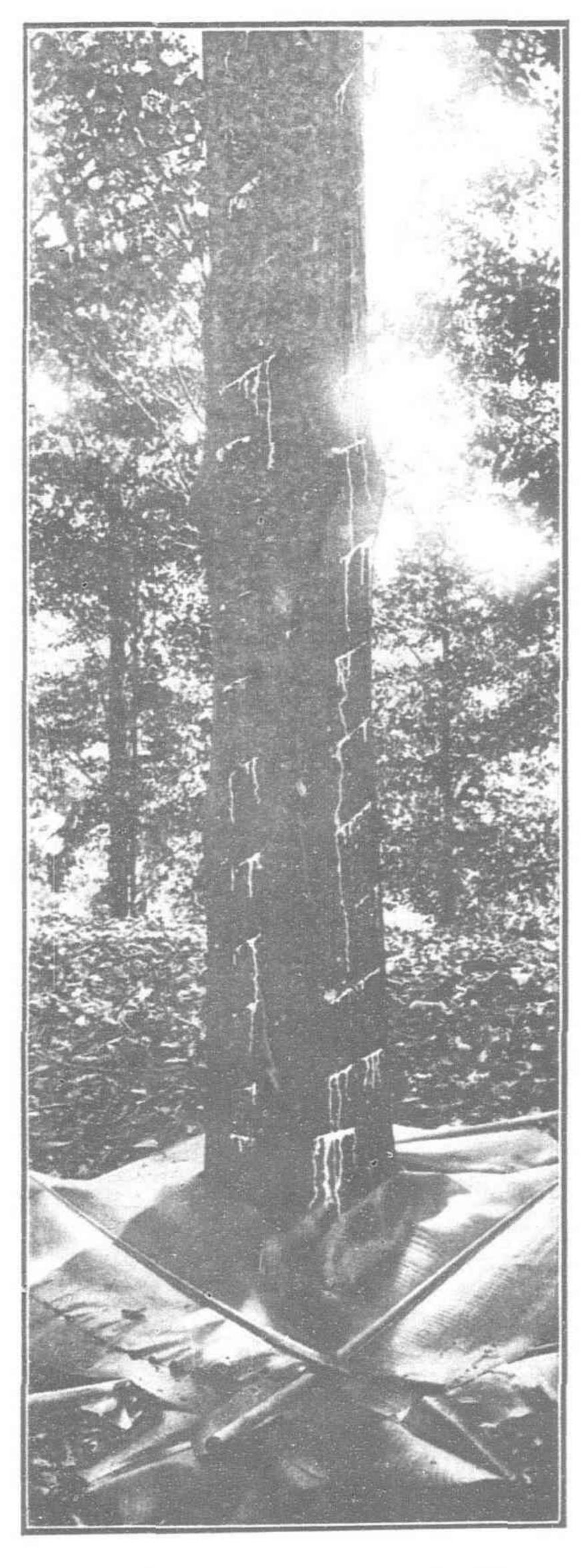
FAVORABLE CONDITIONS IN SOUTHERN ISLANDS.

All informed persons seem to be agreed that it is highly desirable to establish rubber plantations in the southern part of the Philippines outside of the typhoon belt, owing to the fact that the rubber producing trees ordinarily planted are somewhat brittle and are liable to suffer injury as the result of a heavy wind storm.

There are very extensive areas of public land suitable in every way for rubber planting in Mindanao, Basilan, Tawi Tawi, and Palawan, and, as you doubtless know, these regions are almost entirely free from very

violent wind storms.

Land in the Agusan River Valley is especially well suited to rubber growing. Land in the vicinity of the river itself has the advantage of uninterrupted communication with the sea by water. The population of this valley is sparse, and public lands may be rented there in large tracts. According to the best information which I have been able to obtain, drought is absolutely unknown in this region. While it appears to be heavily forested, much of the vegetation is in the form of comparatively small trees, vines, etc., which can be cleared away at small expense, leaving a few very large trees which may be allowed to stand without interference with the growth of any plants not harmed by a moderate amount of shade.



A TREE OF PALAQIUM GUTTA
JUST TAPPED TJIPITIR,
JAVA

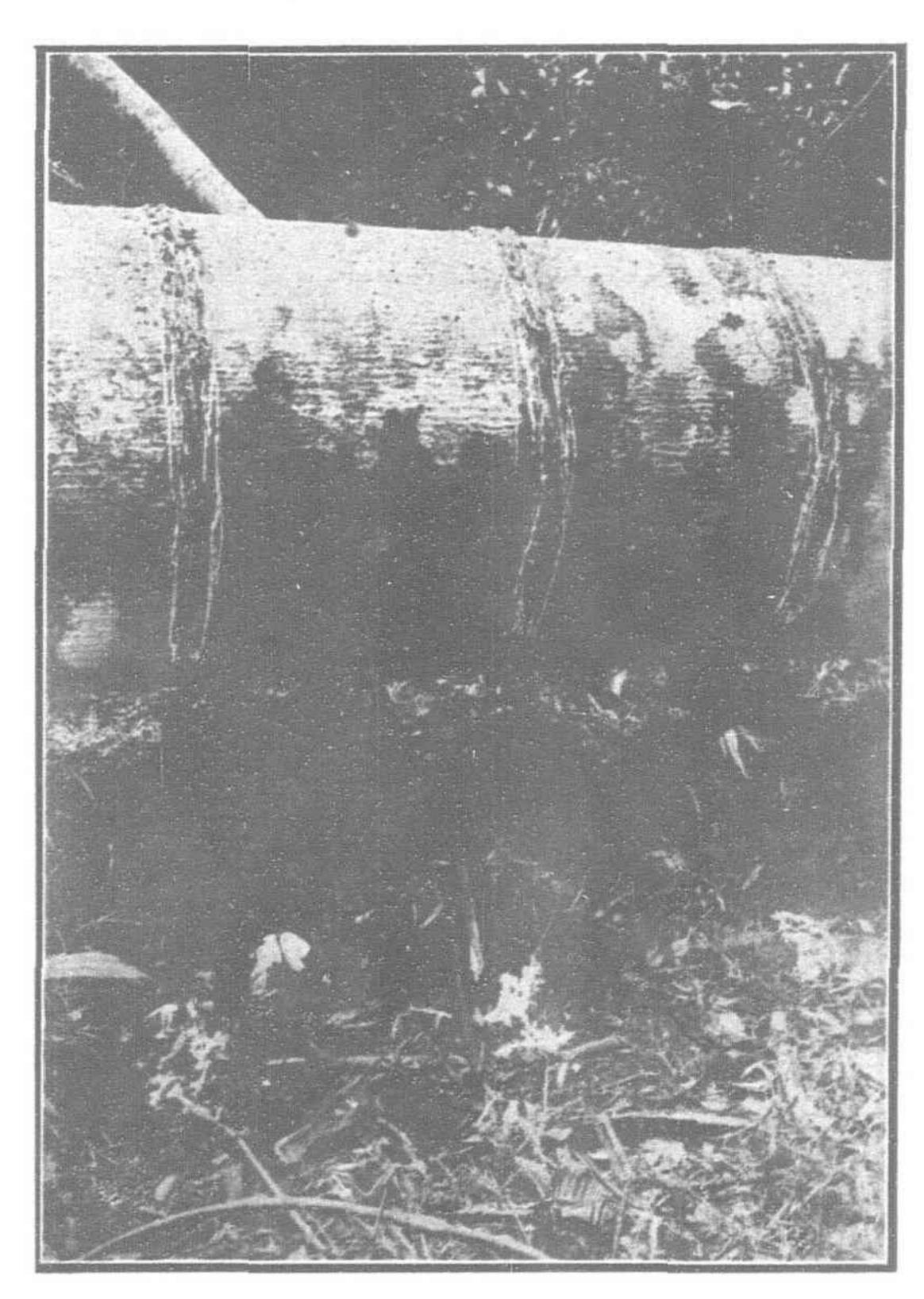
In the subprovince of Bukidnon there are immense grassy plains covered not with cogon, but with pasture grass, which is not ordinarily more than knee high, or waist high at the outside. These lands are very readily brought under cultivation, and no preliminary clearing whatever is necessary. They lie at an altitude of from 900 to 3,000 feet above sea level, and the climate is cool and healthful. During a period of some three years since this subprovince was established as a political division, it has, I believe rained every month. The people, however, state that once in five or six years a drought is likely to occur. Any more or less remote danger from this source can be avoided by arranging for irrigation. This country also is sparsely inhabited, and the people are pacific. The nearest port is Cagayan de Misamis, where

there is a pier alongside of which coast guard boats can lie. A good trail, which will soon be converted into a cart road, affords communication with the coast on the east side of the bay, from which communication may be had with Cagayan de Misamis by water, or around the bay over a fine automobile road. However, on the east side of the bay there is a sheltered cove where a pier, alongside which interisland steamers could lie, could be readily constructed.

I have seen Ceara rubber growing both in the Agusan Valley and in the subprovince of Bukidnon. In both instances young plants were extraordinarily robust.

CEARA RUBBER TREE.

As the rubber planting industry is so new in these islands, and as the variety of rubber producing trees which may be planted is considerable, it is not easy to make a reliable statement as to the returns which may be expected. Undoubtedly the tree which gives the quickest return is the so-called Ceara rubber tree. As previously stated, it grows with extraordinary luxuriousness in the Agusan River Valley and Bukidnon. There seems



A GUTTA PERCHA TREE TAPPED SO THAT
MUCH OF THE MILK IS LOST ON
THE GROUND, DESTRICT OF
ZAMBOANGA, P. I.

every reason to believe that it would produce as abundantly here as anywhere on earth. I have shown samples of Philippine Ceara rubber to persons claiming to be experts, and they pronounce them to be of the best quality. You can obtain samples of Ceara rubber of excellent quality by showing this letter to the Director of the Bureau of Science and informing him that I have requested that you be furnished such samples from the supply of Ceara rubber which I recently gave him for a commercial exhibit in the museum on Calle Anloague.

The following information relative to Ceara rubber is taken from a Bureau of Agriculture

circular on rubber:

In British and German East Africa Ceara rubber is looked upon very favorably. Considerable tracts of land have been planted with it during the past few years, and others are being planted. The practice there is to plant the seedlings in rows 12 feet apart and 6 feet apart in the row on lands that have been cleared of stumps and underbrush at the beginning of the rainy season. Every other

tree in the row is "bled" to death while still young, leaving the permanent trees at distances of 12 X 12 feet.

The tree thrives best in a good friable loamy soil of fair depth, and where the temperature and humidity are high, such as exists at many parts of the coast and other similar districts; but the elevation must not exceed 3,000 feet, as grown above this height it has been proved to contain too much rosin to be of sufficient commercial value.

Propagation is usually effected by seeds, planted in seed beds, though they are sometimes planted "at stake"; but plants may be grown from cuttings. Seeds for planting should be at least a year old from the time they fall from trees, and the latter should be from three to four years old, as seed collected from younger trees does not produce vigorous plants. If



ABSENCE OF DEEP SCARS AFTER
SEVERAL YEARS TAPPING,
BUITENZORG, JAVA

fresh seed is planted, i.e., seed newly collected, germination is very poor, if at all, whereas seed one or two years old germinates readily and well, and gives good results.

Ceara trees come into bearing at about 3 years of age, and produce well until the tenth year, after which producing is not profitable.

Twelve thousand Ceara rubber trees planted in Siasi produced seed at a little more than I year of age.

The following information on Ceara rubber in general, and especially in the Philippines, is taken from a report on the cultivation of rubber by Dr. J. W. Strong, the same having been furnished me by the Bureau of Forestry.

Ceara rubber, so called from the province of that name in Brazil where it has its habitat, is known botanically as Manihot glasiovii,

natural order Euphorbiaceæ, to which also belongs our common casava plant (Manihot utilissima), better known as "camote cahoy."

The Provinces of Ceara and Clara, Brazil, are the so-called dry provinces. Quoting from the report of Robert Cross, a noted botanist to the Indian Government in 1877, he describes the locality as possessing "a very dry, arid climate for a considerable part of the year. The locality traversed by me nowhere seemed to be elevated more than 200 feet above the sea. The soil was in places a sort of soft sandstone or gravel which was bound up in the most extraordinary manner." In other places he "came on a large tract of land covered with immense masses of gray granite. Many good sized rubber trees were growing in the spaces between these granite masses."

The Ceara tree is of moderate size, from 30 to 50 feet high, and 8 to 24 inches in diameter. The leaves are palmate, deeply cut into three, five, or seven oblong ovate lobes, smooth on both surfaces, thin in texture, deep bluish green above, and light beneath. Some of the young plants show a pink petiole. The flowers are large, unisexual and very numerous. The fruit is a round capsule less than I inch in diameter, containing three highly polished seeds variously mottled in color. The seeds have an extremely hard coat, and if kept dry, retain their fertility for years. When the seed capsule becomes dry, it bursts with considerable force, throwing the seed several yards

Ceara being such a quick grower it has been found impracticable to plant any catch crop between it after the first year. Hemp was tried in this province, and, while it did not affect the growth of the rubber, after two years the hemp was either dead or so stunted that it was of no further use.

In selecting land for planting Ceara two things must be considered. The land must be well drained, and should be protected from very high winds. Close planting will to a great extent protect from the high winds, but a wind brake of forest trees left standing would be valuable.

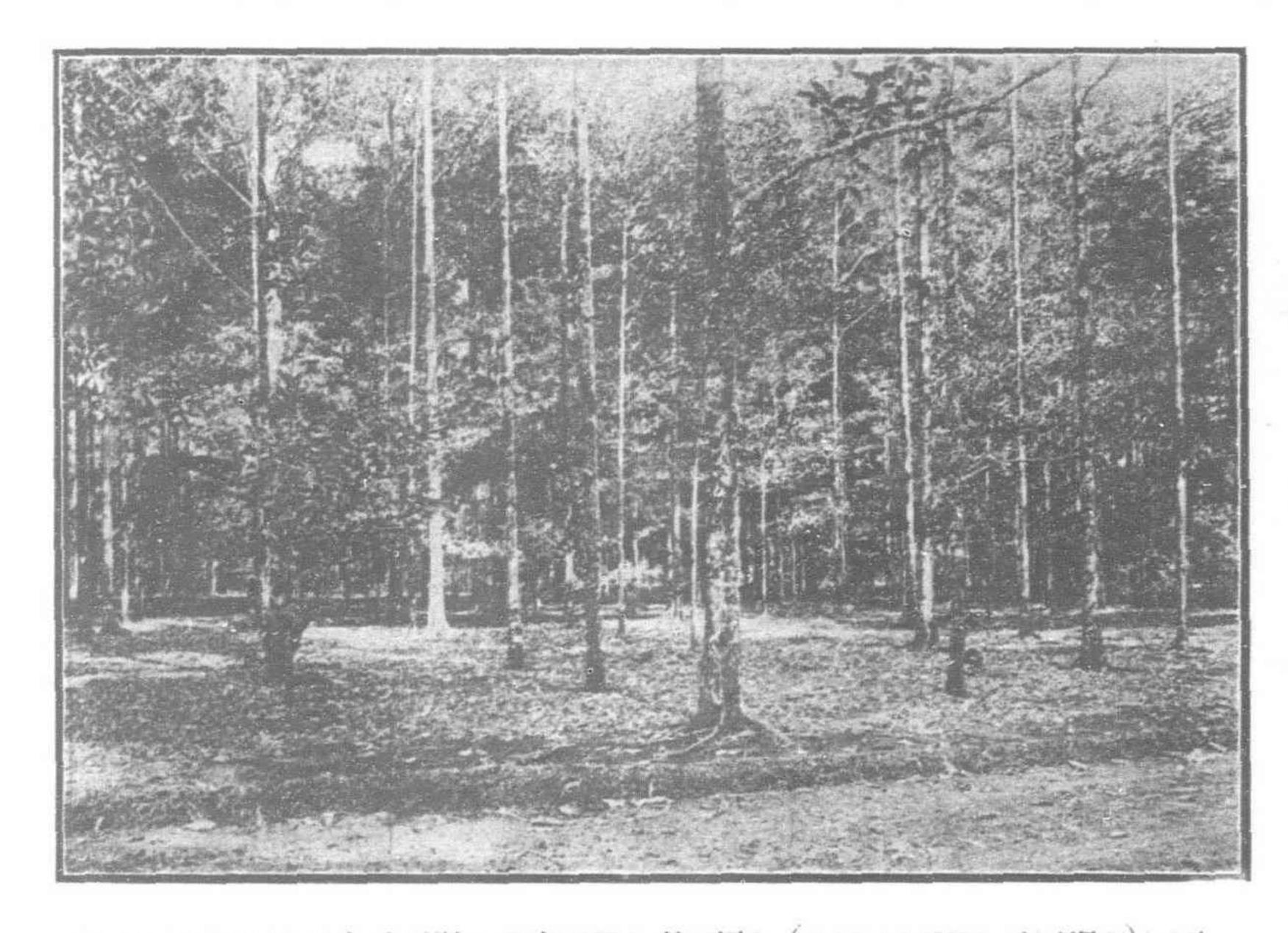
While Ceara will grow on most any soil, well drained, the soil and climatic conditions have great influence on the amount of latex produced, and consequently the amount of rubber contained therein. The richness of the soil, rainfall, season, and humidity of the atmosphere all play important parts in the yield of rubber, not only of Ceara, but other varieties; but of this more later on.

Ceara is readily propagated by seeds or cuttings, and stands transplanting well as far as living is concerned, but transplanting I have found often results in crooked, stunted trees, branching very low down. My experiments from cuttings have been very successful, so far as the cuttings taking root and growing, and the young trees seem to have plenty of latex. Those examined after one year have well developed root systems and the scar at

coat, being very hard and dense, should be filed on one side at the caruncle end, care being taken not to file too deeply, in which case there will be a loss of 100 per cent as ants and other small insects are very fond of the kernel, and will eat it up before germination starts. After the seed starts to germinate insects do not bother it.

The ground should be loosened for at least 6 or 8 inches deep at spot where seed is to be planted, and from three to five seed planted at each stake. If seed are planted in April or May the plants will be 2 feet high within a few weeks, and a catch crop of corn or palay, preferably the latter, should be planted to shade the ground and prevent it from washing, and more especially is this needed if the ground is rolling. The resulting crop of palay or corn will, as a rule, more than pay all expenses for the first year, and the ground will be comparatively free from weeds. About two weedings are all that will be required during the second year, and after that very few weeds will be found to grow,

After the tree is once started it should not be disturbed, as hoeing or digging about the roots of the young tree seems to cause crooked growth with low forking, Trees planted in Basilan in well plowed land, which were afterwards cultivated, while making good growth practically all branched low down, few reaching as high as 5 feet before branching; while trees not disturbed, planted in the hard ground



PLANTATION OF GUTTA PERCHA TREES (PALAQIUM GUTTA) OF VARIOUS AGES, BUITENZORG, JAVA



MORO SAILBOATS, "VINTAS"

away from the tree. I have found plants growing 50 feet from the nearest tree.

Ceara rubber is gathered in Brazil and shipped as "Ceara scrap." Only the simplest, crudest method is used. The collector, before beginning work, sweeps the sticks and stones from about the tree, and after stripping off the thin outer bark, he hacks and cuts the tree from the base to as high as he can reach, letting the latex or milk trickle down the tree to the ground. The latex coagulates very rapidly when left to itself, and collected in this manner is loaded with all sorts of impurities. To quote from Brant's India Rubber, Gutta-Percha, and Balota: "Ceara rubber has a beautiful amber color and is nearly transparent, a property which, according to Marellet, is not possessed by any other rubber. The latex of Manihot is at least equal to, and perhaps superior to that of Hevea (Para), as it contains fewer nitrogenous substances which produce fermentation, and considerably less water. Instead of allowing the milky juice to trickle down the tree, it might be caught in cups and immediately mixed with alkaline water. In this manner the latex would be kept liquid for some time. In Ceara experiments have been made of this kind with excellent results, but unfortunately the native will not listen to anything new."

end of cutting above ground entirely healed over.

In making a planting from cuttings, only smooth, straight branches from the best grown, highest yielding trees should be selected, and should not exceed I inch in diameter. The terminal ends of branches may be used with good results if planted at once, care being taken not to injure the tender bark. The larger cuttings should be about 12 inches in length, the top cut should be made sloping about I inch or more above a bud or leaf scar, and painted over with white lead; this will prevent decay and probably a hollow trunk. The bottom cut should be smooth, and just below a bud. The cutting can be kept in a cool shady place for a day or two without apparent harm. In planting the cuttings care should be taken to get them in the ground straight up, so as to get a straight trunk, and a hole must be made for the cutting, as shoving the cutting into the ground will very often result in slipping the bark and destroying the bud below ground, causing loss of plant or greatly delayed growth.

If it is decided to plant from seed, which no doubt is the easiest and best way, the land should be cleared and burned, and then laid off by line with stakes, perfectly square at the interval decided on for planting. The seed

from same seed, at the same time, made as good growth, with smooth, straight trunks from 6 to 10 feet before branching.

The tendency of Ceara is to make tall, straight trunks, if not disturbed, and as tapping will rarely or ever be done higher than 8 feet. the young tree may be thumbnail pruned at that height, by pinching out the terminal and causing the tree to branch. This will give a uniform appearance to the grove, and will give an increased circumference to the tree. In rich soil the tree makes a very heavy top, and it is a good idea to prune it back rather severely. In localities of heavy wind small branches may be brought across from one fork to the other, the bark removed from one side and on a large fork, the two surfaces brought together and tied in place will unite in a very short time and will act as a brace or truss, preventing the tree splitting.

The question of distance depends greatly on soil and locality. The richer the soil, the greater distance the trees should be planted apart, up to 25 by 25 feet; but it is thought that about 14 by 14 feet is a good distance to plant, and even more closely if high winds prevail. Planted at 14 by 14 feet, the branches will be touching in three years. The tree may be planted anywhere from sea level to

4,000 feet altitude.

Very little experimental work has been done with Ceara rubber, except in the last two or three years, and the yield per tree is given at various amounts. Herbert Wright, perhaps the greatest authority on rubber, places the yield of a mature Ceara rubber tree at I pound per year; this for Ceylon. Other observers place the yield as high as IO pounds per tree per annum.

TAPPING IN THE MORO PROVINCE.

On August 20, 1908, the writer decided to start a series of experimental tappings of young Ceara trees grown from seeds, the trees being just 3 years old on that day. Two hundred trees were taken for the experiment and numbered from 1 to 200 as they ran. The average circumference was 22.1 inches, and the average length of tapping surface was 32.5 inches.

At this time the trees were leafed and in full bloom. It was decided to make the series of tappings 7 days each for 21 days, with a rest of 2 weeks between each 7 days.

The full "herringbone" system was used, with laterals cut 8 inches apart. Small zinc drip-cups, with hooks to fasten to bark, were fixed at top of perpendicular. Each cup had a small round hole in bottom, next to tree, in which a wick was passed to permit a constant flow of ammoniated water down the cut. At the bottom of the perpendicular a piece of

from 4 o'clock to about 6. It was noticed that the trees tapped latest in the evening gave the most latex.

This tapping resulted in 3,600 grams of dry rubber, making a total yield of 13 kilos 200 grams for the entire tapping, almost 4½ ounces per tree for 21 tappings.

	Grams.
First 7 tappings	4,500
Total	13.200

Average per tree, 132 grams.

Average per tree per tapping, 6.29 grams.

Greatest amount from a single tree was from tree No. 197, which gave 224 grams of dry rubber during the seven tappings (second series, and is included in the general average). After a rest of two weeks this tree was tapped again every day for seven days, tapping being done in the evening, and yielded 180 grams of dry rubber. After another period of rest for two weeks it was tapped again every day for seven days, mornings, and yielded 104 grams of dry rubber. During this tapping it was noticed that laterals on left side of perpendicular ran well, but only top and bottom laterals on right side gave any latex. Some three days before the last series of tappings there was a severe wind storm and this tree was split down the main fork for nearly 2 feet, which may

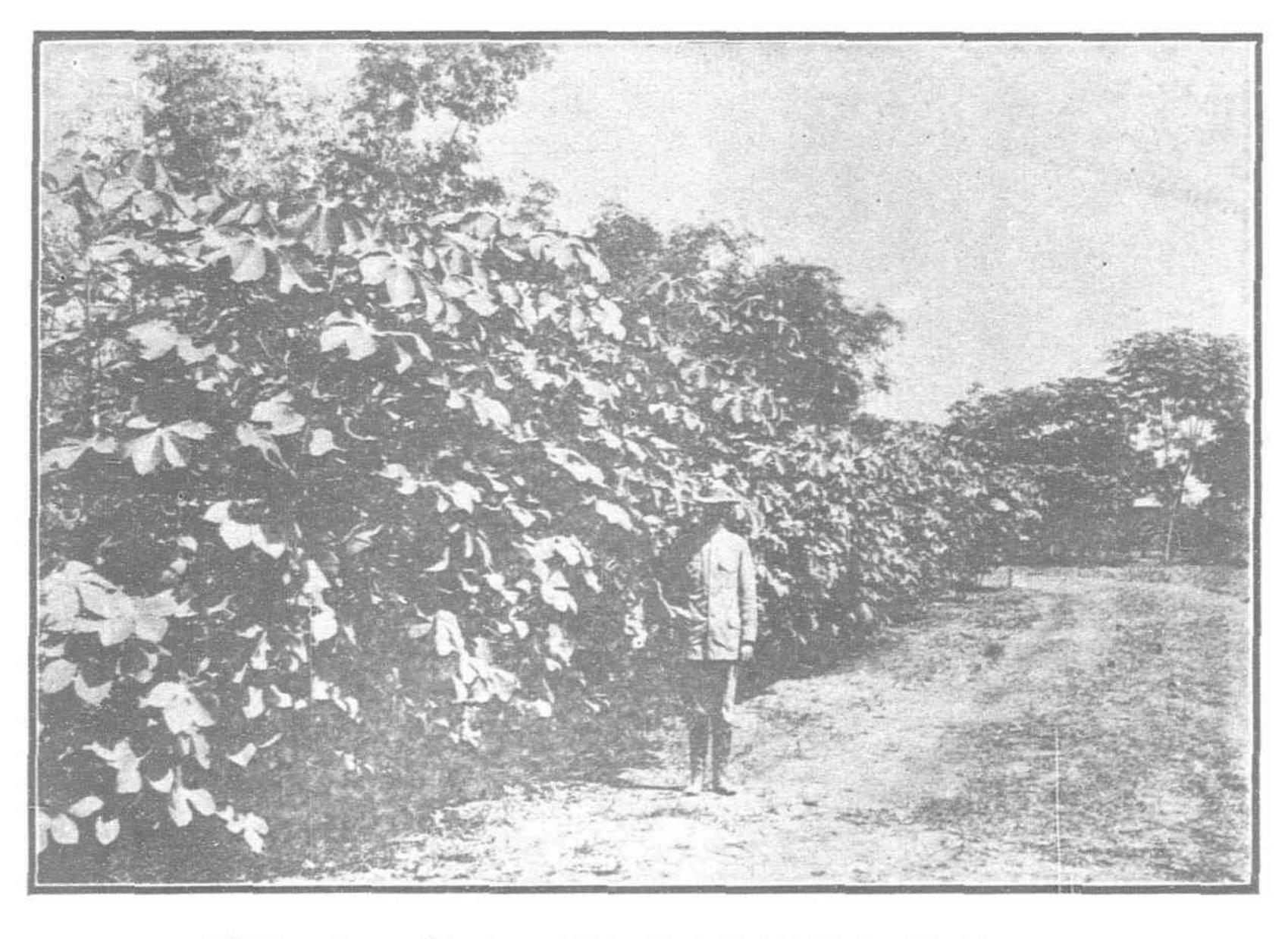
The men used for tapping were a Tagalog, a Yacan Moro, and a Tiruray. The tapping knife used was a modified Ceara rubber knife used in Ceylon. All of these men quickly learned to handle the knife so as not to cut the wood, and in a few days were quite expert tappers.

After the latex had ceased to flow in the morning or evening, it was brought in and after straining through brass wire gauze was poured into tin basins for coagulating.

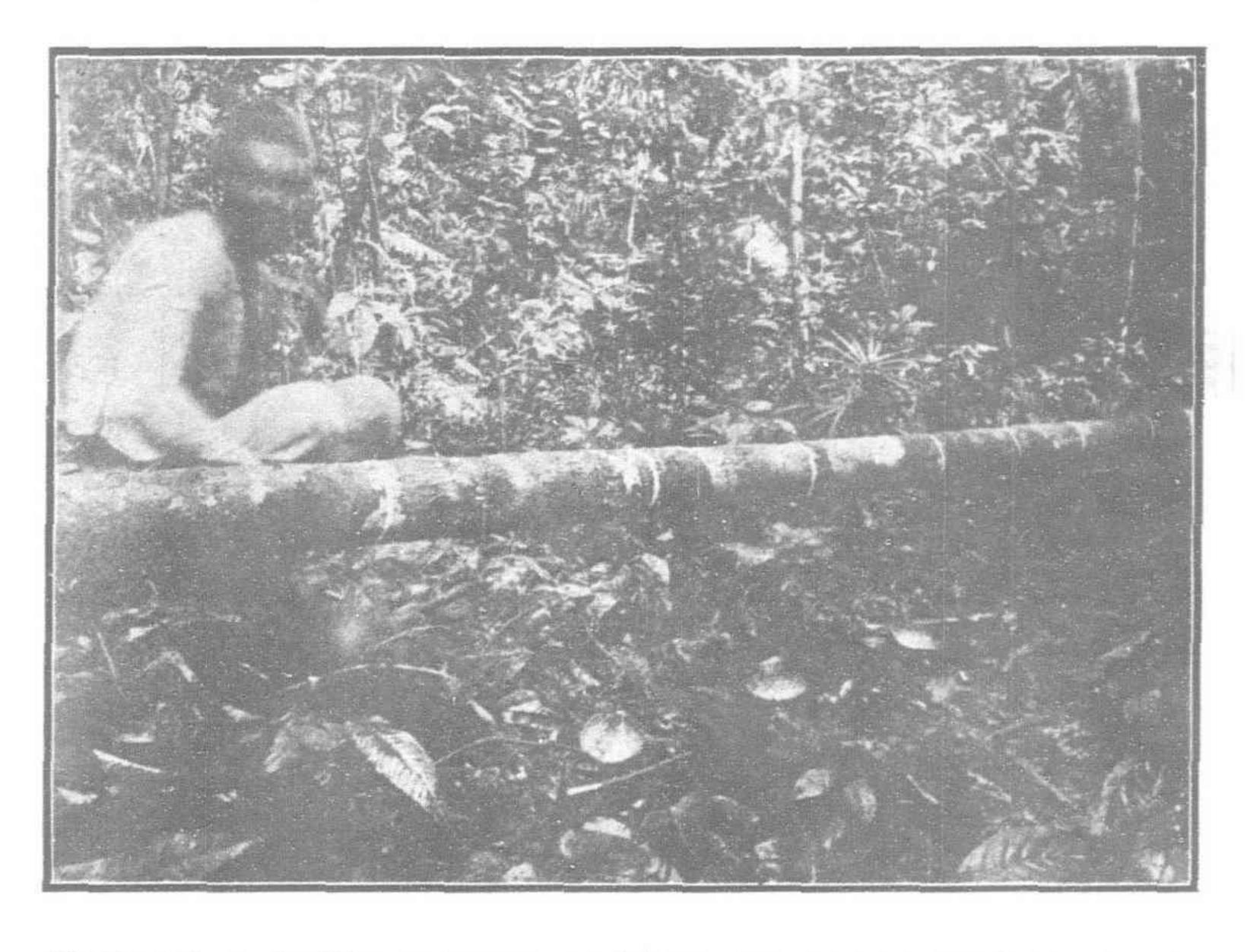
Acetic acid was used to coagulate the latex, just sufficient being used to render the solution slightly acid. When the rubber had all coagulated, leaving the water clear, which was in about two or three hours, the spongy mass was pressed with the hands to expel the water, and afterwards passed through the rolls of an ordinary clothes wringer, which squeezed out most of the water and reduced the cake of rubber to about one-eight inch in thickness. These wet cakes, or "biscuits," were then placed on galvanized wire racks under sheds to dry.

There was invariably a small amount of scrap each morning or evening due to ants getting into the cups, in which case a small mass of coagulated rubber formed about them, due probably to the formic acid which they contain; formic acid being one of the most powerful coagulants of latex.

One man can tap and collect very easily from 100 trees per day, beginning at 5.30 and



CEARA RUBBER PLANTS, EXPERIMENT STATION,
MALATE, MANILA



TAPPING A GUTTA PERCHA TREE SO THAT ALL THE MILK IS COLLECTED IN SHELLS BENEATH. DONE BY MOROS IN TAUL TAUL, P. I.

curved tin was inserted into the bark, conducting the latex to a cup at the base of the tree.

It was found that one-half of I per cent ammonia water in water placed in the drip cups would keep the latex fluid for days, and each collector carried a large bottle of the ammoniated water, a small amount of which he poured into the drip cup before tapping. Each collector also carried a squirt can of the same solution, and after all laterals were tapped a few drops were allowed to flow down the cut. This seemed to promote the flow greatly, and there was scarcely any scrap left in cuts. In fact there was so little that no inconvenience was caused to tappers in reopening the cuts each morning, and no effort was made to coilect the scrap.

During the first seven days trees No. 1 to 100 were tapped every day, tapping was done from about 6 a.m. to 8.30, and resulted in 5,100 grams of dry rubber, or about 1% ounces per tree.

The second seven days, Nos. 101 to 200 were tapped on alternate days for seven tappings, and resulted in 4,600 grams.

After resting two weeks the third tapping was begun and beginning with No. 2 alternate trees, all even numbers, were tapped for seven days, but tapping was done in the evening

account for its behavior. The size of this tree 3 feet from the ground is 36½ inches circumference, and 54 inches the length of perpendicular of tapping surface. Total amount of rubber from this tree, 508 grams, or a little more than I pound. The last two tappings from this tree are not included in the general average, as it was tapped singly.

There was a marked difference in the yield of the trees. Quite a number were noted giving from 15 to 20 grams of dry rubber per tapping, while others gave scarcely any. One fine large tree in particular would only run a gram or so of amber colored latex, which would coagulate in spite of the amnionia.

Two trees in the test had been broken off by the wind some two months before, and the tops were entirely cut away, leaving bare stumps about 4 feet high, but each gave plenty of latex at each tapping.

Two trees standing near where some hemp strippers had been working about five months before were tapped alone, and gave almost double the amount of latex that other trees of same size gave remote from them. This is believed to be due to the large amount of refuse hemp waste, which was surrounding these two trees, and which had thoroughly decayed.

working until 8.30 a.m., at which time tapping should be discontinued, unless it is cloudy; in such case tapping can go on for an hour longer. If tapping is done in the evening also a larger number of trees can of course be handled.

So far no fungus or insect pests have attacked Ceara rubber. Wild pigs, however, are very fond of the starchy roots and will do great damage if not fenced out or kept away by hunters.

Other rubber producing trees which may be planted are the following:

INDIA RUBBER TREE.

Ficus elastica.—This tree has been grown to some extent on a commercial basis in India.

Markham states that the trees may be tapped at the age of 25 years. From that time until the trees are 50 years of age the yield is estimated to be about 40 pounds per tree every three or four years. Only about 40 trees of this species can advantageously be planted on an acre of land and on this basis the yield of rubber per acre might be estimated at about 500 pounds per year. My information is that Ficus elastica is no longer grown as a rubber producer, even in its native habitat where other rubber producing trees have proved more profitable.

PARA RUBBER TREES.

Para rubber.—A large number of seeds have been distributed by the Bureau of Forestry. The growth of young trees in the Moro Province has been very rapid. The quality of the rubber actually produced will not be known for a year or two more when trees are large enough for tapping. The tapping of undersized Para rubber trees gives a latex which has too large a proportion of resin. The trees should be six years old when tapped.

The following information relative to Para rubber is taken from a report on the cultiva-

tion of rubber by Dr. J. W. Strong;

In November, 1905, 20,000 Para seedlings were secured by the government of the Moro Province from the Forestry Bureau in Manila and were distributed, gratis, to American and native planters, and to the Farm at San Ramon. Para did not do well at San Ramon on account of soil conditions, but in many other parts of the Province, notably Basilan, Davao, and the foothills back of Zamboanga—it has made remarkable growth.

Para rubber (Hevea brasiliensis) is also being planted quite extensively in this Province, and is making fine growth. This rubber is propagated from seed entirely, and usually the seed are laid down in a nursery and transplanted when the plants have reached a proper size.

The Para seed does not retain its fertility very long (from 30 to 60 days), and no time taken of the Para rubber seedlings in the seed beds.

Seventy-five of the seedlings, raised from seed planted by the Forester on November 15, 1905, measured August 13, 1906, age 9 months, had an average height of 4 feet 2 inches, with a maximum height of 5 feet and 5 inches.

Measurements of the seedlings obtained by the government of the Moro Province from the Bureau of Agriculture at Manila, and transplanted into seed beds at the Farm, gave the following results:

Date of planting in boxes at the Lamao Forest Reserve, Bataan Province, Luzon, November 13, 1905 (?).

Date of transplanting into seed beds at the San Ramon Farm, January 5 to 10, 1906.

Date seedlings were measured, August 13, 1906.

Age of plants, 9 months. Number of plants measured, 75.

Average height, 3 feet 8 inches. Maximum height, 4 feet 7 inches.

The Superintendent of the Farm informed me that fully 1,000 of the 4, 725 plants obtained from the Bureau of Agriculture failed to grow. after transplanting, on account of crooked taproots, caused by planting the seed in boxes containing but a shallow layer of soil.

In box planting, where it is expected to ship the seedlings, 6 or 8 inches of soil should be

Superintendent had the plot cross-plowed with a 10 and 6-inch plow, and several weeks ago replowed the area with a 6-inch plow, and harrowed and disked it.

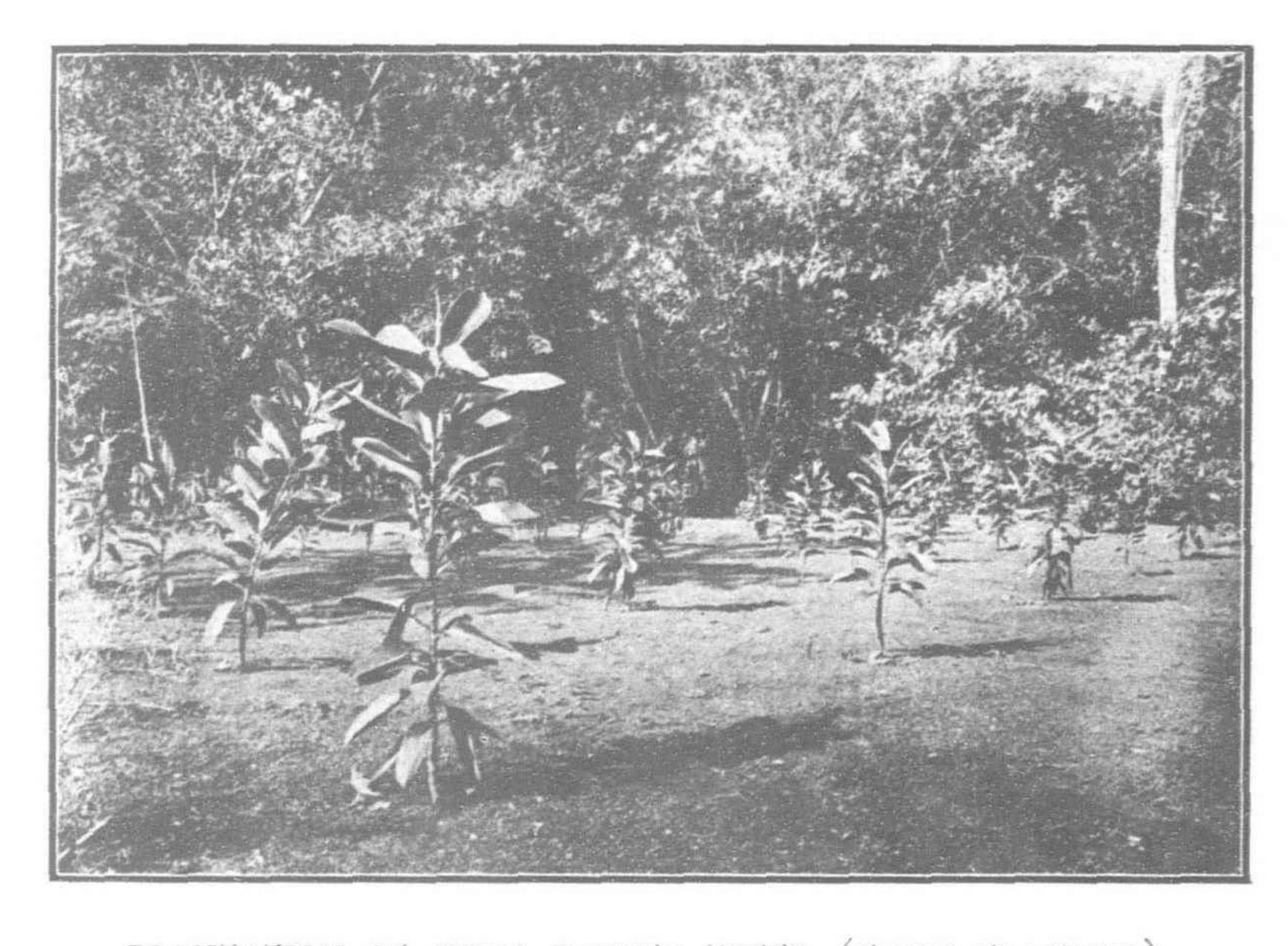
The planted area is situated about a half mile from the shore. The soil is a rich clayloam, fairly porous, and containing but a few scattered boulders.

The seedlings were brought from the nursery to a shady spot near the planting area in large baskets, the roots being covered with earth. A "puddle" of clay and water was made in a bucket, and the plants, as needed, taken from the baskets, the roots placed in the bucket, which was carried to the hole where the plants were to be set. By using this method, the roots of the seedlings were protected from the drying influence of the air.

As the plants have been in nursery beds for nine months, it was almost impossible, on account of the length of the roots, to dig them out without injuring the tap root to some extent, and a number of failures will probably result from this cause.

Rows 18 feet apart were marked off, and the plants set every 18 feet in the row. It is intended that abaca shall be planted in between the rows of rubber.

As neither the Superintendent of the Farm nor the Forester knew how large seedlings should be treated when planted, it was decided to try the following methods:



PLANTATION OF INDIA RUBBER TREES, (FICUS ELASTICA), BUITENZORG, JAVA

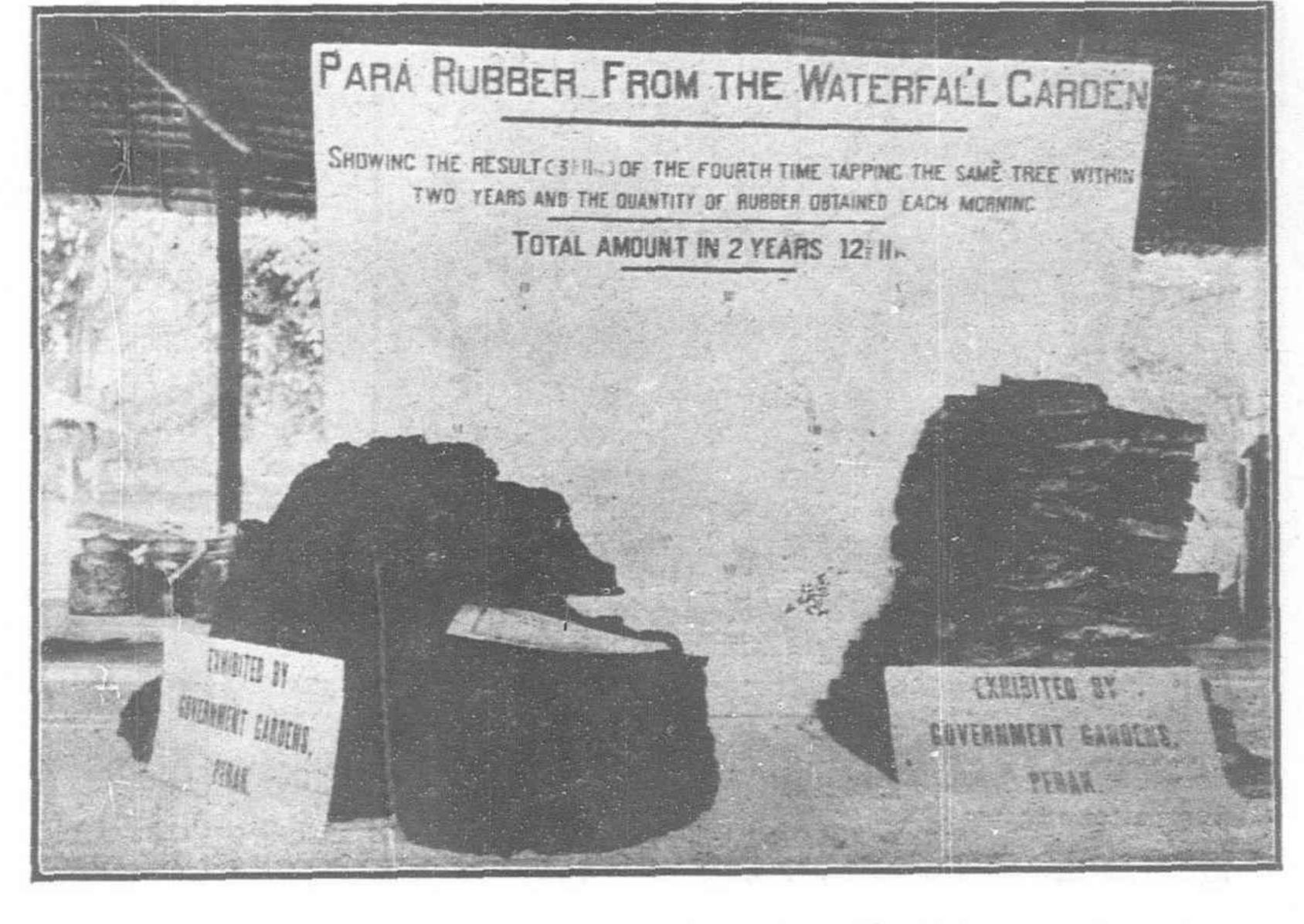


EXHIBIT OF PARA RUBBER, SHOWING YIELD OF TREES AND METHODS OF PREPARING FOR MARKET, PERAK, F. M. S.

should be lost in getting seed planted when received. No filing of seed is necessary and ants do not bother them.

Para is a very deep feeder and its early habit of growth seems to make it an ideal plant for planting through hemp. Planted through hemp 18 by 24 feet, at same time or soon after planting the hemp, it would in no way interfere for at least five years. After that time it would shade the ground considerably, but as it would be of tappable size in the sixth or seventh year at most, the hemp could be entirely removed. having paid all expenses and a good dividend in the meantime.

There is no doubt that the yield from mature Para trees is, as a rule, greater than from Ceara, and where the soil and rainfall are right

Para is the rubber to plant.

Para is tapped, and the latex treated, in about the same manner as Ceara, the latex flowing more freely and not being so prone to coagulate spontaneously.

The following information on Para rubber is taken from a report of W. I. Hutchinson, of

the Bureau of Forestry:

During a recent trip to the San Ramon Farm, made at the request of the Superintendent, in order to investigate the illegal clearing of lands in the vicinity of the Farm, measurements were

placed in the bottom of the box. This will give the tap root a chance to develop and will not cause it to curl up in a spiral form.

Not more than 50 plants should be placed in a box 18 by 24 inches. The boxes received from the Bureau of Agriculture averaged 175 plants, and in many cases the roots and stem formed such a tangled mass that it was difficult to separate the plants without injury.

As an experiment, 18 Para seedlings and 14 Ceara seed were planted at the Farm on May 28, 1906, in the sandy soil 150 feet from the beach, where the underground water is more or less brackish. Only four of the Para plants are living at the present time (August 15, 1906), the remainder having wilted and died. A few of the Ceara seed sprouted, but the plants, after growing a few inches in height, gradually became less and less vigorous and finally died. This would seem to prove that Ceara and Para are not suited to land containing an excess of salt, or where the water is at all brackish.

During the writer's stay at the Farm, 300 seedlings of Para were set in a permanent plantation.

The land used for the plantation was cleared by the Spaniards many years ago. In 1904 it was plowed, but allowed to grow up to weeds again. In the spring of this year (1906) the

First three rows (66 plants) cut back to 18 inches and all leaves removed.

Fourth to sixth rows inclusive (66 plants), cut back a foot, but lower leaves not removed.

Remaining 8 rows (176 plants), new growth, formed during the last few weeks only, removed.

It is hoped that by trying these different methods, and watching the growth of the plants, some clew as to the proper treatment of large seedlings may be obtained.

The seedlings which were sold, on account of their large size, were placed in a box 18 by 24 inches, with the tops projecting over the end. the roots being covered with earth. A hood of abaca leaves was placed over the box, and instructions to water the plants during transit once a day, in the evening, tacked on the side. All the seedlings treated in this manner stood a several days' journey successfully.

Para rubber trees are usually tapped first when 6 or 7 years old, and continue to yield rubber indefinitely.

CASTILLOA RUBBER TREES.

Castilloa elastica.—These trees are usually tapped first when 6 or 7 years of age, and continue to yield rubber indefinitely.

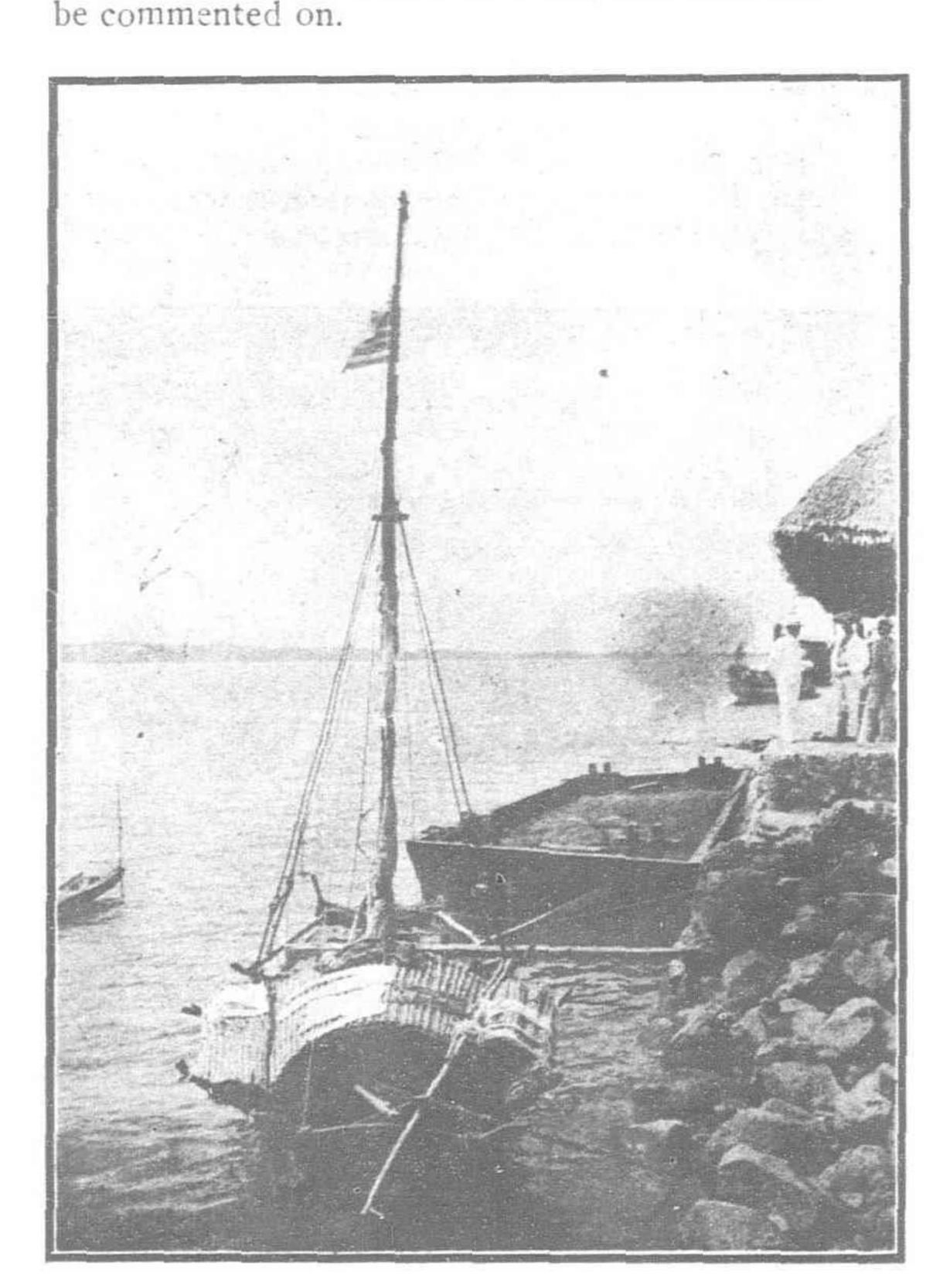
The following information on Castilloa rubber is taken from a report on the cultivation of

rubber by Dr. J. W. Strong:

The first Castilloa brought into the islands was introduced by the San Rafael Plantation Co., of Basilan, in 1905, and has made phenomenal growth; some of the trees measuring 32 inches in circumference I yard from the ground, with a corresponding height and crown. Castilloa is perhaps the most handsome of the three rubbers now growing in the Province.

This rubber has not been planted so extensively as either of the other two, Davao District and Basilan having a few thousand. It is making wonderful growth in both localities, and will probably be more extensively planted. Castilloa has not been a general favorite in the East, as it does not come into bearing until 8 or 10 years of age and its rubber is hardly up to the standard of either Para or Ceara. It is propagated from seed, and stands transplanting better than either Para or Ceara. It may be propagated by cuttings but this is hardly practicable.

The tapping and coagulating of Castilloa latex is different from Ceara or Para, and need not



CHINESE TRADING BOAT COLLECTING
GUTTA PERCHA AT
PARANG PARANG

CONDITIONS IN SOUTHERN ISLANDS.

Referring now specifically to the questions of your correspondent, rubber plantations might be located on the Agusan River, in the subprovince of Butuan, in the subprovince of Bukidnon, in the Moro Province, and anywhere in the southern half of Palawan without serious danger from heavy wind storms, and with all other conditions of climate and soil favorable. The elevation above sea level would be so slight as to be negligible, except in the subprovince of Bukidnon, where the maximum elevation available would be 3,000 feet, this being the height above which it is not deemed desirable to plant Ceara rubber.

The largest number of acres which a corporation which is authorized to engage in agriculture can control would be 2,500, and this amount of land could be purchased outright or leased. If purchased, the cost would be not less than P to per hectare, which would probably be the actual cost price if wild land was taken.

Payments for land purchased from the Government may be made as follows: Twenty-five per centum at the time bid is submitted,

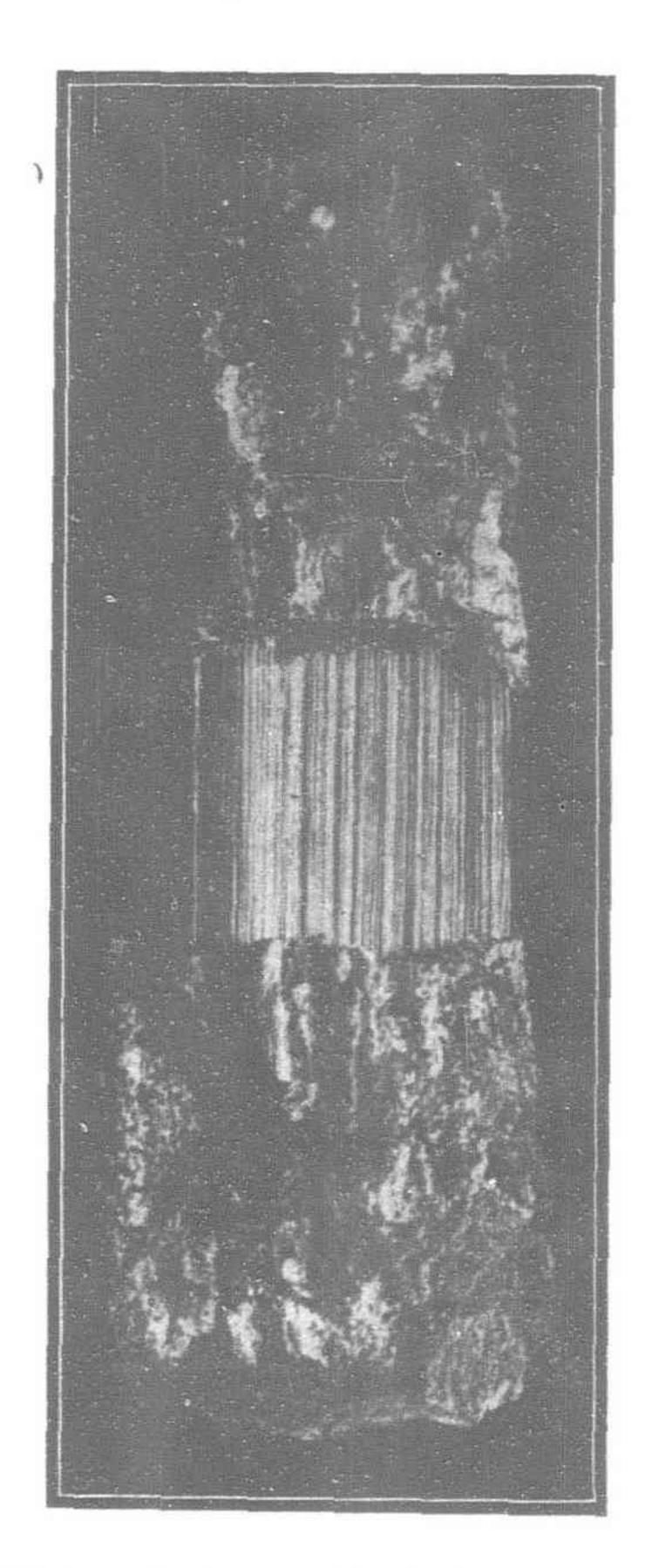
and the balance may be paid in full upon the making of the award, or may be paid in one installment at the expiration of five years from the date of the award. All sums remaining unpaid after the date of the award bear 6 per centum interest per annum from such date until paid. The purchase can be completed only after five years of occupation and cultivation.

The annual taxes would be one-half of 1 per

centum of the value of the property.

If land is rented, the cost of a 2,500-acre tract would be approximately as follows: Survey Bureau of Lands, P 300 to P 600, depending upon the difficulty of clearing the land. In the subprovince of Bukidnon, the cost of a survey should not exceed P 150, as little or no brushing out would be required. The rental on a 2,500-acre tract would be approximately P 530 per year, payable in advance. There would be no taxes on the land.

Transportation in the subprovince of Butuan would be by the Agusan River to the town of Butuan; thence by local steamer to Cebu. The Agusan River has, for a distance of more than



A PIECE OF DRY BARK FROM A RUBBER VINE, BROKEN AND PULLED APART, SHOWING THE IMMENSE NUMBER OF RUBBER FIBERS.

dry weather of 3 feet, and any concern owning a rubber plantation on the river would, of course, need to operate its own launch.

It may interest you to know that the Province operates a 30-foot launch on this river. It is capable of carrying 50 sacks of rice on a 20-inch draught. It has a 7½-horsepower Mietz and Weiss petroleum engine; has a speed of 10 miles per hour, and costs to operate approximately P8 per day of 10 hours, including salary of native engineer.

The cost of freight from Butuan to Cebu, and from Cebu to the world's markets, is doubtless better known to the Manila Merchants' Association than to me, and at all events can readily be ascertained.

The soil in the Agusan River Valley is a rich loam made up from the wash of the immense forests through which the river flows.

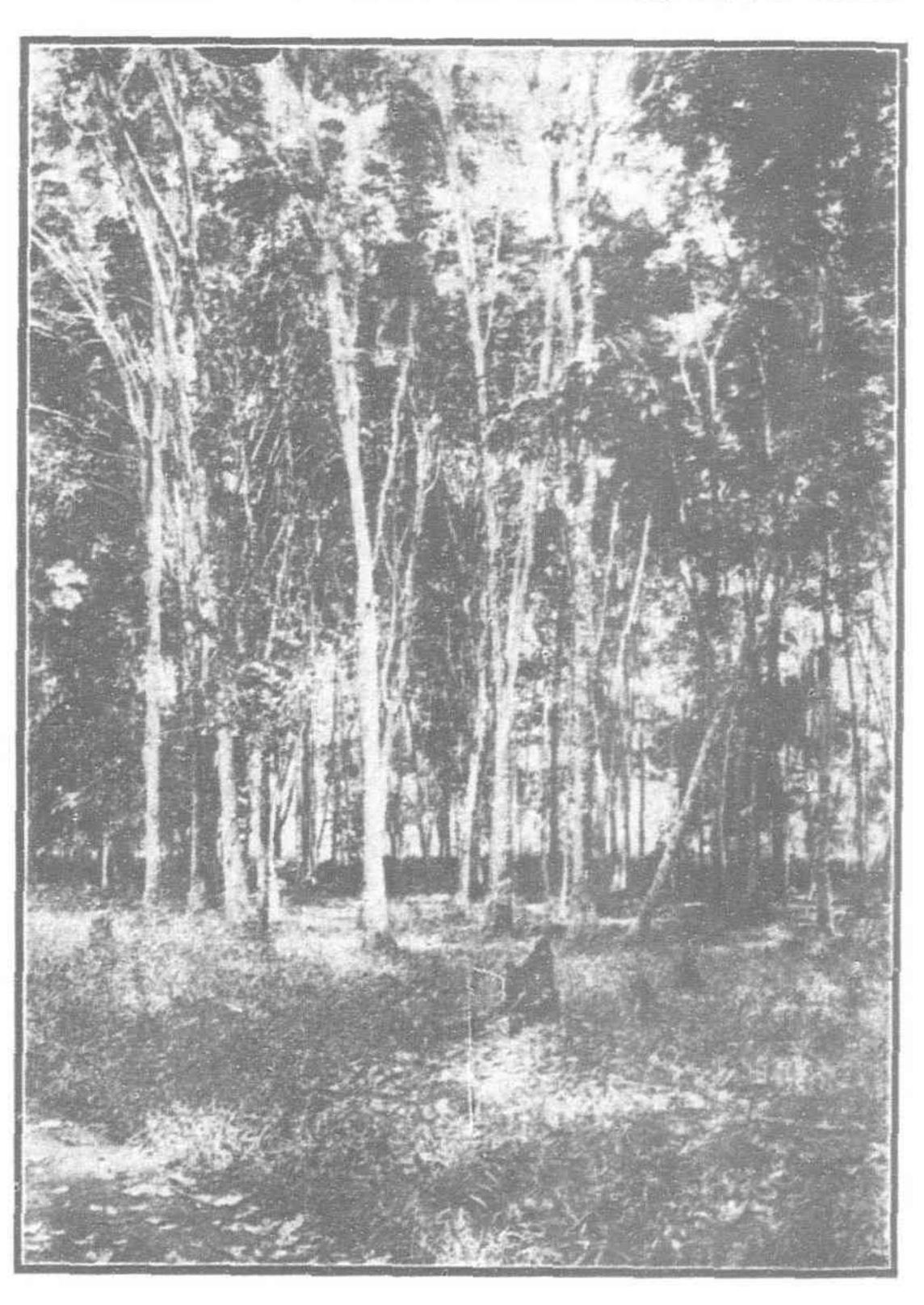
The following report by Mr. C. B. Robinson, Economic Botanist of the Bureau of Science, embodies the latest information which I have been able to obtain relative to rubber growing in the Moro Province:

RUBBER INVESTIGATIONS IN MORO PROVINCE,
JUNE, JULY, 1910.

The writer was detailed from this Bureau to accompany Mr. C. A. Littler, representing a firm of British capitalists, who contemplated establishing a rubber plantation at some point in the islands that should prove suitable, where also there would be accessible a good supply of rubber and gutta-percha, obtained from wild plants. Mr. Frank E. Bost, a rubber specialist and the manager of the proposed plantation was also of the party, to which was added at Zamboanga, Mariano, the Forestry Ranger for the District. Great assistance was given by the officials of the Moro Province, and of the District of Cotabato.

It was therefore the aim of the expedition to see as much as possible of the places where the planting of rubber had hitherto been attempted, and to inspect localities which from extended inquiries seemed likely to prove suitable for a plantation.

Leaving Manila late on the afternoon of June 3, with stops at Dumaguete and Cebu, Zamboanga was reached on the 9th; San Ramon was visited on the 10th, and a more



PLANTATION OF PARA RUBBER TREES,
PRODUCING SEED BOTANICAL
GARDEN, SINGAPORE

extended trip to Basilan was made on the 15th, with stops at Margosatubig, and Malabang, and a change of boat and overnight stop at Parang on the 16th-17th. Cotabato was reached at noon on the 17th and finally left on July 2, the trips in the mountains extending as far up the valley as Fort Pikit, and through the Liguasan March from Cabacsalan to Cotabato. The return steamer was taken on July 2 at Parang, and followed through her route to Zamboanga, Jolo, Port Banga, Dumaguete, and Cebu; Manila being reached before noon on the 10th.

The general results arrived at were that a site for the proposed plantation was found near Reina Regente, Cotabato; that all the three kinds of rubber-yielding trees which have been planted, Ceara (Manihot glaziovii Muell-Arg.), Para (Hevea brasiliensis Muell-Arg.), and Castilloa (C. elastica Cerv.), were found to make very satisfactory growth, but the first is so subject to injury, that its planting is being abandoned by those who have tried it most extensively; that a fairly large quantity of rubber (chiefly gutta-percha, the true rubber not being distinguished locally) is brought

down the Cotabato Valley, though at present the supply is erratic, owing to the uncertainty of a market; several species of Ficus were found which upon rough testing proved to yield a certain amount of rubber. More extended observations follow:

SAN RAMON.

Near the buildings at San Ramon, there are young seedlings of Para, perhaps 200 in number, about I meter in height. The older trees are few in number, about I kilometer from the station in an easterly direction, near the Sax River; no cultivation has been given them, the tallest is about 6 meters and nearly all have been more or less injured.

BASILAN, DR. J. W. STRONG'S PLANTATION.

This is situated a little over 1.5 kilometers from Isabela, and is by far the most extensive rubber plantation seen, and to the best of our information equally the most extensive existing in the islands. A rough plan is appended.

Originally, Ceara was almost exclusively planted followed quickly by Para and Castilloa. While the first has grown well and many of the trees have reached a size suitable for tapping, it is so liable to injury from wild hogs, deer, and termites, that it is being superseded by the other species.

Measurements made at Dr. Strong's gave the following results. All are the circumference in inches, 3 feet above the surface of the ground. The growth of the Castilloa is especially remarkable.

Para, 4 years 6 months, 23, 23.5, and 22. Para, 3 years 6 months, 16, 15, 11, 12.5, 13, 15.5, 12, 15.5, 13.5, 10, 16 and 15.5.

Castilloa, 3 years 10 months, 34, 35.5. Castilloa, 2 years 10 months, 27, 22, 24.5, 25.5, 24, and 24.5. (There are 35 trees of this age, all bearing seed.)

Ceara, 2 years from cutting, 18.5.

Both the climate and the situation of Basilan are suited to rubber growing. Drawbacks exist in the wild hogs and deer; these can be kept out by suitable fencing.

Experimental tappings of rubber have already been made, with satisfactory results.

SAN RAFAEL PLANTATION, BASILAN.

This is situated about 3 kilometers west of Dr. Strong's, with which it is connected by a trail. The hacienda contains about 300 hectares. A number of the older trees are planted near the house. Measurements made of these gave the following figures:

Ceara, 5 years, 32, 39, 33, 33, 31.

Castilloa, 3 years 10 menths, 28, 22.5, 26

(200 of this age).

There are said to be on the place 900 to 1,000 Ceara trees, 3 years old, and 100 to 200 Para, all small, 3 years old. There has been no cultivation, and injury has been experienced from hogs. None of the trees have been tapped, although some of them are quite of sufficient size.

MARGOSATUBIG.

There are two small plots of Ceara on opposite sides of the road in the place, about 3 years old, making good growth, one man having 25 trees.

BULUAN. (DATTO INUK.)

Beside the house of Datto Inuk at Buluan, there are some 35 Ceara trees, about 2.5 years old, planted very closely, about 1.5 meters by 1.5 meters. These are entirely free of weeds. Measurements same units as before; 16.5, 16, 12, 13.5, 17.5, 13.25, 15, 17.5, and 17.25. In addition, there are about 1,000 Ceara trees, 10 months old, in the hills at some distance, planted about 2.7 meters by 2.7.

PORT BANGA.

Mr. Redding of the firm of Williamson & Redding stated that at the head of the bay they had planted a considerable number of trees; that these had been planted and left without cultivation, and were a total failure. They are now planting and cultivating, but this has only recently been undertaken.

OTHER PLACES IN THE ZAMBOANGA DISTRICT.

Several other planters have rubber trees; the work has apparently not included cultivation, and the results attained are meagre. None of these were visited.

WILD RUBBER

The chief supply of this comes from the Cotabato Valley, either from the head waters of the Rio Grande, or from the hills along one of its branches, the Dansalan, where three Indians of whom Bombay is the chief, gather an amount practically limited by their financial resources. It is chiefly obtained by the hill tribes, and comes out through Cotabato; some also is said to be exported through Sarangani.

Datto Piang's estimates of the quantity he could procure ranged from 400 to 500 piculs every three months; he formerly got 700. A small quantity comes from the Buluan country; the rest is divided between the Dansalan, and the headwaters of the Rio Grande, as stated above. Bombay gets about half of the Dansalan output, but at present little or none, owing to the uncertainty of payment. Prices there range from 12 to 30 pesos per picul (137.5 pounds). A fairly large lot was seen at Cotabato, whence it is exported to Jolo; the dealer there was also seen, and it appears that no cleaning is done except washing, first in hot water, and then working with the feet in cold water; it is then sent to Singapore where there is a machine. The export from Cotabato for the 11 months of the then current fiscal year (ending May 31, 1010) was nearly 87,000 kilograms.

Small quantities are exported from Margosatubig to Zamboanga, one dealer sending about 5, and another 2.5 piculs per month. This is obtained from the Camaralang River.

No distinction is made between gutta-percha and vine rubber, but the great bulk from description and the samples seen is of the former. The vine rubber does, however, form a part of the export, but it is more difficult to obtain, and has brought no higher prices.

SITES FOR RUBBER PLANTATIONS.

With this is involved the labor problem. Along the banks of the Rio Grande, the land is too low and too wet for rubber planting. except in a few places. The best of these seemed to be in the vicinity of Reina Regente. where the south side of the river is approached by rolling hills, well-wooded attaining elevations of 60 to 100 meters. The town of Dalauan (Datto Piang) is a few miles below, and the prospects of obtaining a sufficient supply of labor through his co-operation seem to be good. Good land is said to be available above Pikit, but the transportation problem so far up the river would be too great, and the supply of labor insufficient for work upon an extended scale. A limited amount of good land could be found on the southern arm of the river, hardly sufficient for the purposes desired.

> C. B. ROBINSON, Economic Botanist.

ESTIMATES OF EXPENSE AND PROFIT.

Practically all available land is now covered with timber. This of course at once raises the amount of the cost of clearing. The difficulty involved in obtaining really reliable information relative to the cost of clearing land, the cost of planting, and the returns derived from catch crops affords the true explanation of my long delay in replying to vour letter.

The following is an estimate furnished me by the Director of the Bureau of Agriculture:

Cost of clearing land.—The cost of clearing heavy jungle is estimated to be about P20 per acre, this includes the slashing, cutting of trees, burning and disposal of the larger trunks.

The cost of clearing average jungle is

estimated at P16 per acre.

The cost of clearing open jungle is estimated at P12 per acre. (Estimated by hemp growers.) Cost of planting three principal kinds of rubber per acre.—An idea can be had of this

by giving the estimated cost for Para rubber in the Malay Peninsula, as estimated by R. G. Watson:

Estimate for 1,000 acres; 250 acres to be opened each year

opened each year.	
First year:	
Premium	P3,000
Survey fees	1,000
Kent	1,000
Clearing, felling, and burning 250 acres (P15 per acre)	3,750
Lining, holing, and planting 250 acres	01/ 5
(P6 per acre)	1,500
Plants	800
Houses for laborers	2,000
Lines	1,500
Medical—Hospital, medicines, etc	2,000
Labor-Advances, immigration, etc.	1,500
Superintendence	3,600
Total	24,150
Second year:	
Rent	P1.000
Clearing, felling, and burning 250 acres	3,750
Lining, holing, and planting 250 acres	1,500
Plants	800
Roads and drains	1,500
Labor	1,000
Superintendence	4,000
Tools and sundries	750
Weeding 250 acres	2,500
Total	17,900
Third year:	
	P1,000
Rent	3,750
Lining, holing, and planting 250 acres	1,500
Plants	800
Roads and drains	1,500
Medical	1,000
Labor	1,000
Superintendence	4,000
Tools and sundries	6,000
Supplying	100
Total	22 150
	23,150
Fourth year:	
Rent	1,000
Lining, holing, and planting 250 acres	3,750
Plants	800
Roads and drains	1,500
Medical	1,000
LaborSuperintendence	4,000
Tools and sundries	1,000
Weeding 750 acres	12,000
Supplying	100
Total	27,650
Fifth year:	1,000
Rent	800
Medical	1,000
I,abor	1,000
Superintendence	4,000
Tools and sundries	1,000
Total	23,800
Sixth year:	
Rent	P1,000
Roads and drains	800
Medical	1,000
LaborSuperintendence	1,000
Tools and sundries	1,000
Weeding 1,000 acres	
Total	25,000

Seventh year:	4,000
Rent	-
Medical	1,000
Labor Superintendence	4,000
Tools and sundries	
Weeding 1,000 acres	-
Total Eighth and following years as seventh	
year	
The cost of weeding gradually decre in the eleventh year it is practically nil.	ases til
Profits.	
Seventh year:	
at I pound rubber per tree, sold at 3s. per pound	
250 acres, planted 150 trees per acre,	
at 1½ pounds rubber per tree	72,23
Total income	120,53
Less cost of production, shipping, etc., of 93,750 pounds at 1s. 6d. per pound	
Net profit	60,26
Eighth year:	
250 acres at I pound per tree and 3s. per pound	and the second
250 acres at 1½ pounds per tree and 3s. per pound	72,32
per pound	96,428
Total income	216,96
Less cost of production, etc., 253,125 pounds at 1s. 6d. per pound	108,482
Net profit	108,481
Ninth year:	
250 acres at I pound per tree and 3s.	
per pound	48,214
per pound	72,321
500 acres at 2 pounds per tree and 3s. per pound	192.856
Total income	313,391
Cost of production, etc., 243,750 pounds	
at is. 6d. per pound	156,696
Net profit	156,695
Tenth year	
250 acres at 1½ pounds per tree and 3s. per pound	P72.321
750 acres at 2 pounds per tree and 3s. per pound	
Total income	
Less cost of production, etc., 262,500	
pounds at 1s. 6d. per pound	180,800
Net profit	180,801
Eleventh year:	
per pound	385,710
pounds at 1s. 6d. per pound	192,857
Net profit	192,853
And so on each year, annual profit P	
with a probability of still increased yield. This estimate would apply to Castill	d. loa and

Ceara, as there would be very little difference in the cost of seed or young plants. Cost of going over once with bolo, cutting

weeds and brush, P4 per acre.

Returns from catch crops.—The amount of these crops, such as corn, sweet potatoes, casava, etc., that can be grown per acre will depend somewhat on the way the trees are set out. Some planters advise that the rubber trees be originally planted 15 feet apart, the

object of this being to cover the ground with shade as soon as possible to prevent the growth of weeds and underbrush. Three or four tappings can be made on these trees before they crowd to such an extent that it will be necessary to take out the surplus trees, leaving the trees in the permanent grove 30 feet apart. In case the trees are planted 15 feet apart, only a very small portion of the land could be planted to catch crops, as in cultivating it will be necessary to leave a strip 6 feet wide along each row of trees to prevent injury to the trees in cultivating. If the trees, however, are set out originally 30 feet apart, the intervening spaces may be occupied by catch crops, provided there are markets for such crops as are grown. Only about 85 per cent, of the total area should be considered available for catch crops.

Corn should yield about 30 bushels per acre, worth in Manila P1.10 per bushel. Sweet potatoes should yield from 100 to 200 bushels per acre, depending upon the character of the soil and the kind of cultivation. This crop is more or less perishable, but large quantities could be used for feeding laborers. Some hemp planters have claimed that they have grown a sufficient quantity of sweet potatoes between the rows of hemp to pay for the cost of weeding the hemp each year. Casava will yield from 20 to 30 tons of roots per acre. Up to the present time it has not been found profitable to grow casava, owing to the fact that suitable market cannot be found in the Philippine Islands for the starch and when shipped to New York the cost of manufacture and transportation about equals the price obtained.

Cost of clearing, plowing, and harrowing .-Cost of plowing loose sandy soil covered with cogon once, P3 per acre. Cost of harrowing,

Pi per acre.

A person who has a coconut plantation in northern Mindanao on cogon land claims that it is necessary to plow the land each year and harrow at least once a month in order to keep down the cogon, unless some crop is grown between the trees, in which case the cultivation of the crop should be sufficient to keep down the weeds and vines. It was suggested to this person that he plant the intervening spaces in velvet beans and keep the velvet beans from destroying the young trees by having a man go over the ground at least every two weeks and chop off all vines approaching the trees. The cost of this need not exceed Po.20 per acre for each time.

Cost of seed .- Ceara rubber seed should not cost over P2 per 1,000 in large quantities. Allowing 250 seeds per hectare, the cost for

seed would be Po.50.

The following estimate of the cost of clearing land and planting it in coconuts, and of the profits derivable from the sale of forestry products and from catch crops has been furnished me by Mr. C. H. Lamb, Superintendent of the Iwahig Penal Colony. So far as concerns the cost of clearing for coconut planting and the profits derivable from catch crops, these figures will answer as well for rubber as for coconuts. It should, of course, be remembered that mangrove land is not suitable for rubber production.

The island of Palawan differs geologically and geographically from other islands in the

Philippine group.

It is different in its fauna and flora, and in its rainfall, and to quite an extent in its seasons.

Peculiarly, good hemp will not grow in many localities, nor will some other plants which thrive on other islands, due probably to the topography of the country.

The soil is varied, and in fact, over the greater portion of the island the soil which is feasible of cultivation differs in character, even in small areas which can be described by the

word patchy. There are two crops, however, which thrive well on the island of Palawan, where the land is at all susceptible of cultivation; same are rice and coconuts. The same statement can almost be made as regards corn. (The average corn yield is as good as the writer has seen anywhere, with the exception, that frequently patches of soil are found on which corn does not thrive, but peculiarly the same soil will

grow good rice, and it will also grow good coconuts.)

The expense of preparing land for cultivation must always depend to a certain extent upon the manner or method, and particularly upon the location. The following figures can be accepted as a safe guide:

Felling trees will cost from nothing to P20

per hectare.

Cutting and burning will cost from Pio to P80 per hectare. Stumping will cost from P10 to P150 per

hectare. The first plowing will cost from P3 to P10

per hectare. Three plowings will cost from P5 to P20 per hectare.

Planting in either corn or rice will cost from P4 to P10 per hectare.

Taking into consideration all classes of land found; the level, rich, short grass land, free from timber and brush, which has only to be plowed, and which may be called first-class land. Second, the small valleys along the streams and in the mountain coves, almost always covered with forest more or less heavy, and which may be called second-class land. Third, the same kind of land covered with "bojo" or small brush, which may be termed

third-class land. Fourth, particularly unfavorable locations, which may be termed fourth-class land. Classification is made, considering that the

minimum average for planting the first crop of

rice or corn is P32 per hectare. The general average is P85 per hectare. This is a safe and conservative estimate, and will be found sufficient, taking into consideration all conditions.

best, which can be planted at the least expense.—

It has been found by actual experience that the

The expense of P85 is divided as follows:

(a) Felling trees, P5.

Cutting and burning, P20. (c) Digging stumps, P40. (d) For plowing, P14.

(e) Planting, P6.

If misfortune and unfortunate incidents come this average will still be found ample, However, to cover same, an additional allowance of P15 per hectare is made, which would make a maximum total of Proo per hectare.

Ordinarily through the island of Palawan, if forest land is cleared and planted, from 10 to to 100 "trozos" can be had from I hectare of land. Same will average from 300 to 2,000 cubic feet, which will net from P40 to P400.

A safe and conservative amount as a return

from I hectare of land is PIIO.

The minimum return from I hectare of land in rice harvest is 20 cavans, and the average maximum is 50, although 70 is not uncommon.

The average value of this rice or palay is l'2.55 per cavan.

Therefore, the return from the rice crop from I hectare of land will average P40 to P125.

Forty-one pesos is assured, therefore hectare of land cleared of ordinary timber and planted in rice will yield the first year P151, i.e., P110 in timber and P41 in rice or corn.

This same hectare of land, according to above figures, has been planted at a maximum cost of Pioo, thereby giving us a margin of P51 per hectare.

Regarding mangrove swamp, what I carefully compiled from actual experience shows that the firewood and tanbark therefrom can invariably be depended to pay the cost of clearing the land and planting.

The foregoing data are the basis upon which the writer works, or in other words, it can be assumed that throughout the island of Palawan the first quick return crop will pay for the clearing of the land, and on at least 50 per cent of the locations will also pay for the planting of the land in coconuts. The planting of the nuts will cost from P6.25 to P12.50, or 222 cents per tree, or a maximum cost of P22.50 per hectare. However, it is usually done for less, and this is the maximum average. Also the quick return crop which has been planted on the land will produce a profit over the clearing

of P22.50 per hectare, sufficient to pay the expenses of planting the coconuts, which are usually planted at about the same time rice is planted.

The same land will produce two more quick return crops, that is, three quick return crops in all, without interference with the coconuts.

The best crops, according to the writer's experience, are, first, a crop of corn, subsequently two crops of mountain rice, by which time coconuts will be too large to permit any further cultivation of rice or corn, but camotes and so forth may be planted. However, the latter are not considered a profitable crop. If the first quick return crop does not produce sufficient revenue to pay the expense of planting the coconuts, the planter has a maximum expense of 221 cents per tree. There will be no additional expense for the next two years of the tree's life if quick return crops are planted; on the contrary there is usually a profit. However, if the second and third quick return crops are only sufficient to pay the expense of keeping the land clean, there are really only three years to care for the trees before they begin to bear. Experience has shown that this expense will average to cents per year per tree, provided not less than 2 hectares are planted, actual data was based in one instance on 5 hectares, and in another on 10.

This results in a cost of 30 centavos per tree in addition to the original investments, or expense of 22½ cents per tree, making a total of 52½ cents per tree from the data of planting to the bearing age.

This is the maximum average, and unless caused by ignorance or mismanagement, should not be greater; in 50 per cent of the locations it will be less. However, it is not safe to figure on less for any location along the foot of the mountain ranges where jungle and forest must be coped with.

Cost data taken from actual experience, and handled in a different manner, have given the writer practically the same results, and in different parts of the Philippine Islands has ranged from 60 cents to P1.85 per tree, brought to the bearing age.

The most favorable conditions which the writer has ever encountered on Luzon show that coconuts have been grown, that is, brought to the bearing age, which there is 7 and 8 years, for 60 cents per tree.

However, in that particular place the conditions were absolutely favorable, and the low cost was due to the clever and economic administration of the planter. Adjoining planters expended on an average of from P1 to P1.50 per tree, to bring the trees to the bearing age.

These same remarks will apply to the island of Mindanao. The maximum reliable statement is P1.85 per tree; however, the estimate provided for a most expensive administration.

The writer's cost data are all based upon 50 cents per day for labor, and do not include road construction, except trails and earth roads for carts, "kangas," and so forth. This is due to the fact that coconut planting has been done either on the coast or in the vicinity of navigable rivers, of which Palawan has many.

The conclusion reached, from the writer's experience, is that coconut planting for a permanent crop and investment can not be equaled by any other known permanent crop, not even rubber. It is superior to rubber in the island of Palawan. The usual argument advanced to the contrary places great value upon the fact that Palawan does not have typhoons which would damage the rubber crop—the same fact is almost of equal value to the coconut.

The attached notes regarding this feature are taken from general conditions, and not from especially favored localities.

AGUSAN RIVER VALLEY.

Comparatively little labor is to be had in the Agusan River Valley, and it would probably be necessary to bring most of that required from Iloilo. If no catch crops were planted, the land after being cleared should be gone over with bolos twice each year. It should be

remembered that where Ceara rubber is planted it is nearly useless to put in a catch crop, as the rubber itself promptly occupies the ground. If Para or Castilloa is planted, such crops as corn, camotes, peanuts, or sesamum can be put in. It is impossible to state definitely the returns which would be derived, so much depends upon proper cultivation methods and good management. I am frank to say, however, that if I were to plant rubber in the Philippines, I should, in the light of my present knowledge, plant Ceara rubber, and make it that and nothing else on the ground planted with rubber, devoting other ground to the growing of crops which give quick returns.

It should be stated that much of the land in the Agusan River Valley is apparently admirably adapted to the growing of tobacco and that there is every theoretical reason to believe that excellent tobacco might be produced there but tobacco, like Ceara rubber, is a voracious feeder, which quickly impoverishes the soil.

BUKIDNON.

In the subprovince of Bukidnon the cost of transportation would, of course, be the ordinary cost of overland transportation by cart, and would depend directly on the distance, which might be anything from 10 miles to 120 miles, depending on the location which the planter chose to select. The products would need to be taken across the bay to Cagayan de Misamis, and be shipped thence to Cebu, although a pier might be built on the east coast of the bay, and the small cost of transportation across the bay saved.

Character of soil: Good, rich loam, in some places sandy, and in others clayey. Practically nothing but grass is at present on the land and there would be no cost for clearing, as the grass could be burned during the comparatively dry part of the year. The cost of planting would be very small, as the land would require only plowing and harrowing. The expense of maintenance, which would consist of occasional replowing and harrowing, would also be small.

Probably the best catch crop to grow on this land would be upland rice, as the country does not now produce enough rice to feed its people, owing to the scarcity of draught animals. The land should produce 30 cavans of unhusked rice per acre, worth P3 per cavan. The additional cost involved in putting in this rice would be practically nil, as the land would need to be plowed in any event, and the rice could be drilled in.

SOUTH PALAWAN.

The conditions as to land are the same as in Agusan.

Transportation facilities: A small steamer every three weeks from Puerto Princesa to Manila. Land might be had in the immediate vicinity of Puerto Princesa, and communication with that town maintained by launch, as the land selected would naturally be adjacent to the sea shore. The soil in south Palawan is perhaps the richest in the Islands, with the exception of that in Mindanao and Mindoro. Land can be selected which is now covered with grass, or with a comparatively light growth of bushes. This land is very suitable for raising upland rice, corn, camotes or sesamum.

MORO PROVINCE.

I am not myself sufficiently familiar with conditions in the Moro Province to give any reliable information, but such information can doubtless be had from the Provincial Secretary or from the officers of the Zamboanga Chamber of Commerce. They are progressive people down there and I am sure they will be glad to help out in any way they can.

With a few more years of experience it is to be hoped and anticipated that much more detailed information relative to rubber growing in the Philippines may be obtainable. At present we must fall back upon the fundamental proposition that conditions as regards climate and soil are ideal and that labor is to be had in a reasonable amount, and that the ultimate result will depend here, as elsewhere, on the character of the management.

GLOSSARY.

Picul =137.9 pounds avoirdupois.

Cavan =16 gallons 3 quarts 1 pint.

Meter =39.37 inches.

Kilometer=0.62137 mile.

Kilogram =2.2046 pounds avoirdupois.

Hectare = 2.471 acres.

Abaca is Manila hemp.

The peso (P), Philippine currency, is equivalent to 50 cents United States currency, and the centavo is equal to ½ cent. Except where gold is specified, the amount is expressed in Philippine currency.

TRADE BOOMING IN THE PHILIPPINES

A favorable net change in the trade balance of the Philippine Islands is shown by a statement issued early in June by the bureau of customs, which covered the first ten months of the present fiscal year. The imports for the first ten months of the present fiscal year amounted to P86,691,858 as compared to P84,484,568 in the corresponding period of the previous fiscal year. This is an increase of over two million pesos. The exports, however, for the period in question amounted to P84,376,656 while in the previous year during the ten months the total was P64,520,102. Thus there was an increase in exports of P19,856,554 against an increase in imports of P2,207,200 figures which are in every way satisfactory. It is true that the trade balance is still against the Philippines but there has been a favorable net change and had it not been for abnormally heavy importations of rice the balance might easily have been on the other side. The total trade of the Philippines for the ten months of 1912 was P171,068,514 against P149,004,670 last year, an increase of P22,063,844.

There was a healthy increase in the trade between the Islands and the United States. The exports to the United States increased by P6,261,941 and the imports by P995,812. In 1012 the total trade with the United States was P70,915,314 as against P57,395,620 in 1911. Thus nearly fifty per cent of the total trade of the Philippines was with the United States.

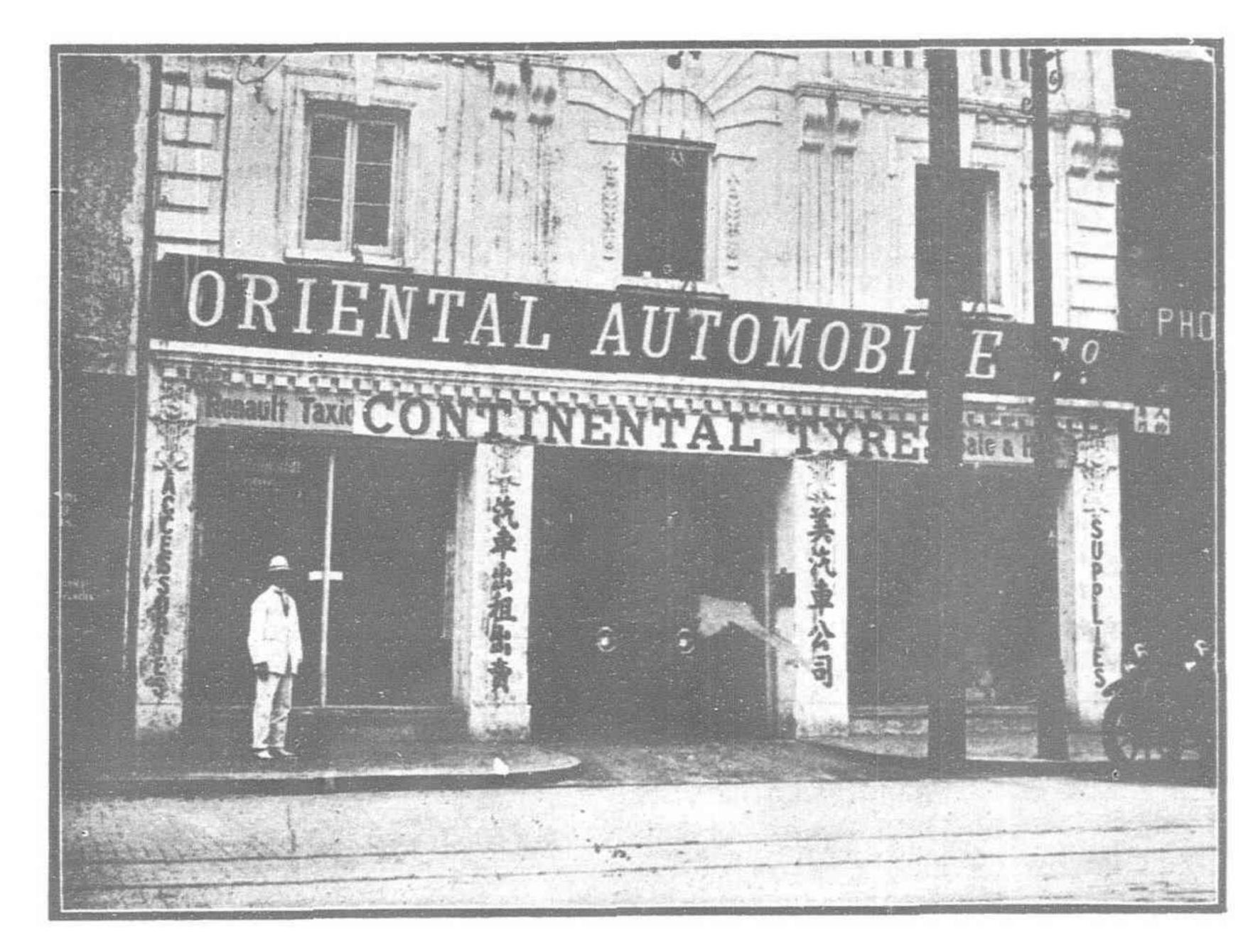
"VIA SIBERIA"

The improvements on the Trans-Siberian road that have already been made are many, and more are promised. There seems to be no limit to the laudable ambition of the Russian railway authorities in this direction. They are now holding out the prospect that before many years are over trains will be able to cover the distance from St. Petersburg to Vladivostok in six days. While that is a matter for the future, during the present summer the time of the express trains will be considerably shortened. The outward express, from Moscow to Vladivostok, will take 8 days 17 hours, 35 minutes, while from Vladivostok to Moscow the time will be 8 days, II hours, 35 minutes. There is naturally also a reduction in time from St. Petersburg. The outward journey to Vladivostok will occupy 9 days 2 hours, and from Vladivostok to St. Petersberg 9 days 4 hours, 40 minutes. The ordinary passenger trains will take 12 days 12 hours on the journey from Moscow to Vladivostok, and on the homeward trip II days 12 hours. Next year it is anticipated that a further reduction in the running time of 24 hours will be made.

With the South Manchurian Railway also steadily improving their service business men in the Far East will continue to save further appreciable periods of the time which now, more than ever before, is a synonym for money.

MOTOR CAR INDUSTRY OF THE FAR EAST





TWO OF THE LEADING GARAGES IN SHANGHAI

Probably no other industry has made greater strides, or made more noticeable progress in the Orient, than that connected with automobiles. Probably no other section of the world offers more obstacles to be overcome by this industry than China. Here is a country where good roads have been a long way from the ambition of the people, where generations upon generations have demanded hardly more than foot paths, where the wheel-barrow has been used for all overland transportation, afterwards to be supplanted by the ricshaw, or the old horse cart. Consequently the motor car boulevard has never been thought of, nor, indeed, has any sort of road for wheeled vehicles ever seemed worthy of maintenance. However, it is interesting to note the remarkable changes that have been taking place in the past few years. Along with the foreigner comes the motor car and the idea of something better than a crooked narrow alleyway which the Orientals have always been prone to call streets. Especially where the foreigner is located, have the extensions of the cities been tending toward reasonably wide thoroughfares properly kept.

The foreign population of the large Oriental cities is so cosmopolitan that cars of practica!ly all motor car manufacturing countries are to be found. In the city of Shanghai alone can be found almost five hundred automobiles running under French and English licenses. The total number of different makes is about seventy and is as follows-American--Cadillac, Hupmobile, Hudson, Ford, Maxwell, Columbia, Oldsmobile, Reo, White, E.M.F., Rambler, R.G.H., Flanders, Winton, Marmon, Pullman, Buick, Chalmers-Detroit, and Overland. The English cars are Daimler, Argyle, Humber, Swift, Star, Beaufort, Austin, Crossley, Napier, Rover, Standard, Siddeley, Singer, Cleamont-Talbot, Vulcan, Arrol-Johnson, Allday and Onions, Belovie, Adams, Vauxhall and Sheffield-Simplex. The French cars are, Renault, Prima, Hotchkiss, Unic, Mors, Rochet-Schneider, Delaimay-Bellville, Gregoire, De Dion, Pengeot, Le Gui, Berliet, Brasier, Panhard, Delage, Darrag. The German cars are Opel, N.A.G., Otto Beckman, Lloyd, Mercedes, Stoewer, Protos, Adler. Italy is represented by the S.P.A., Switzerland by the Turicum, Belgium by the Metallurgique, and Holland by the Spyker.

It is particularly interesting to note the great number of landaulette cars that may be seen on the streets, and it is certain with so many different makes represented, the prospective buyer has sufficient samples from which he may form an opinion of the kind of car he wants. The prejudice which has always seemed to exist in reference to other manufactured goods seems to be dying away when it comes to the motor car and the Englishman who formerly would not ride in anything except an English made car, no matter how noisy or out of proportion it appeared, can now be seen riding in a French or American car as often as in a car from his home land, and the Americans or Frenchmen or Germans seem to be buying their cars from a point of view which suits their particular need rather than in encouragement of the manufacture of their home country. The Chinaman is in a position to make an unprejudiced selection, and in most cases it will be noticed he is seen gliding along the crowded streets or the country roads in an American machine.

In Shanghai we are so located as to judge just what progress the world is making in automibile manufacture. The lines of the body and the construction of the engine and the working parts of the motor car a few years ago were far from the same in idea, while now it can be noticed with interest that the French, German, English, and American cars are taking on a similar appearance and the general make up of the engine is becoming more standardised.

When one stops to think of the great number of cars running on the streets of Shanghai, with a foreign population of about 12,000, and remembers that these cars are practically all owned by foreigners one must be impressed with the great possibility for the sale of cars when the Chinese population of about 1,000,000—among whom there are to be found so many immensely wealthy Chinese—is seized with the

ambition to own motor cars. From the Motor Car manufacturer's point of view, there is an unlimited amount of business to be done some day, and it will not be done with the foreigners either, for the Chinaman is proving himself to be a great lover of the automobile, and although he was not inclined to jump from his wheel-barrow ideas to that of the motor car without due consideration, it is gratifying to note how he has been taking advantage of the opportunity of renting cars. The introduction of the taxicab by the Oriental Automobile Co., of Nanking Road, has placed the cost of a motor ride so low in price, that the Chinaman is found to be its best supporter. When the Chinaman discovered that he was able to board a taxicab, and enjoy the fresh air and the pleasing scenery of the surrounding country, at the cost of a few Mexican dollars, he immediately began to see the practicability of the motor car, as well as the great amount of pleasure to be derived in owning a car. Although the enterprising American firm which introduced the taxicab into the Orient was very likely planning upon good business for the present, still the amount of benefit which the taxicab will do for the motor car industry in general in the Far East cannot fully be estimated.

It may be said without hesitancy that all the advance of the motor car enterprise of China in the past is merely building a foundation for the great future business, and when that time comes, the roads of China will be improved to such an extent, that the Flowery Kingdom (now the Flowery Republic), will offer unlimited pleasure to the world's motorists. It is acknowledged that at present, the combined lengths of the roads fit for motoring, would not total the length of one comparatively short motor run at home, but this is attributable to the fact that only in the open ports where the foreigner resides has it seemed necessary to plan for decent thoroughfares. The Chinese population as a whole are contented with their small footpaths stretching in all directions across the fields, but when the wealthy Chinese feel their ambitions properly stirred the future, as the past, will prove what wonders may be wrought in this strange land. How simple it all will be when the time is ripe-almost unlimited expanses of flat country where motor roads would be among the most interesting that the world could offer, coupled with the fact that Chinese labor is so cheap that the building of good roads will cost less than in any other part of the world. If it were possible to employ Chinese labor in America, or in Europe, long enough to build the desired road, at the same time paying the Chinaman the mere pittance of a wage he receives in his home land, it would not be long before the world's motor roads would undergo such a revolution that they could not be compared with the present. So it is that China will some day take advantage of these opportunities, and build model roads for the world.

When that time comes, the most interesting of all motor drivers will be available. A trip from Shanghai to Peking for instance would embody mountains, deserts, quaint country villages, pagodas and temples galore, and more than a glance at life in the interior, which could never be gained in any other way. There will, however, always be the disadvantage to the motorists in China of the persistency of the

population to ramble all over the thoroughfare. The wider the road the greater the distance the lower class Chinese travels, first on one side of the road, then on the other, dreamily thinking of his ancestors, and never giving a thought to what may be coming up behind him on the road. In this he cannot be blamed, he has never had to fear anything swifter than a wheel-barrow, and after the wheel-barrow coolie shouts to him, he still has several seconds to remove himself a few feet to the right or to the left as his fancy directs. There have never been any road rules in China, and a walk down a crowded street behind a native, will explain forcibly enough, that the man in front, is merely moved by intuition.

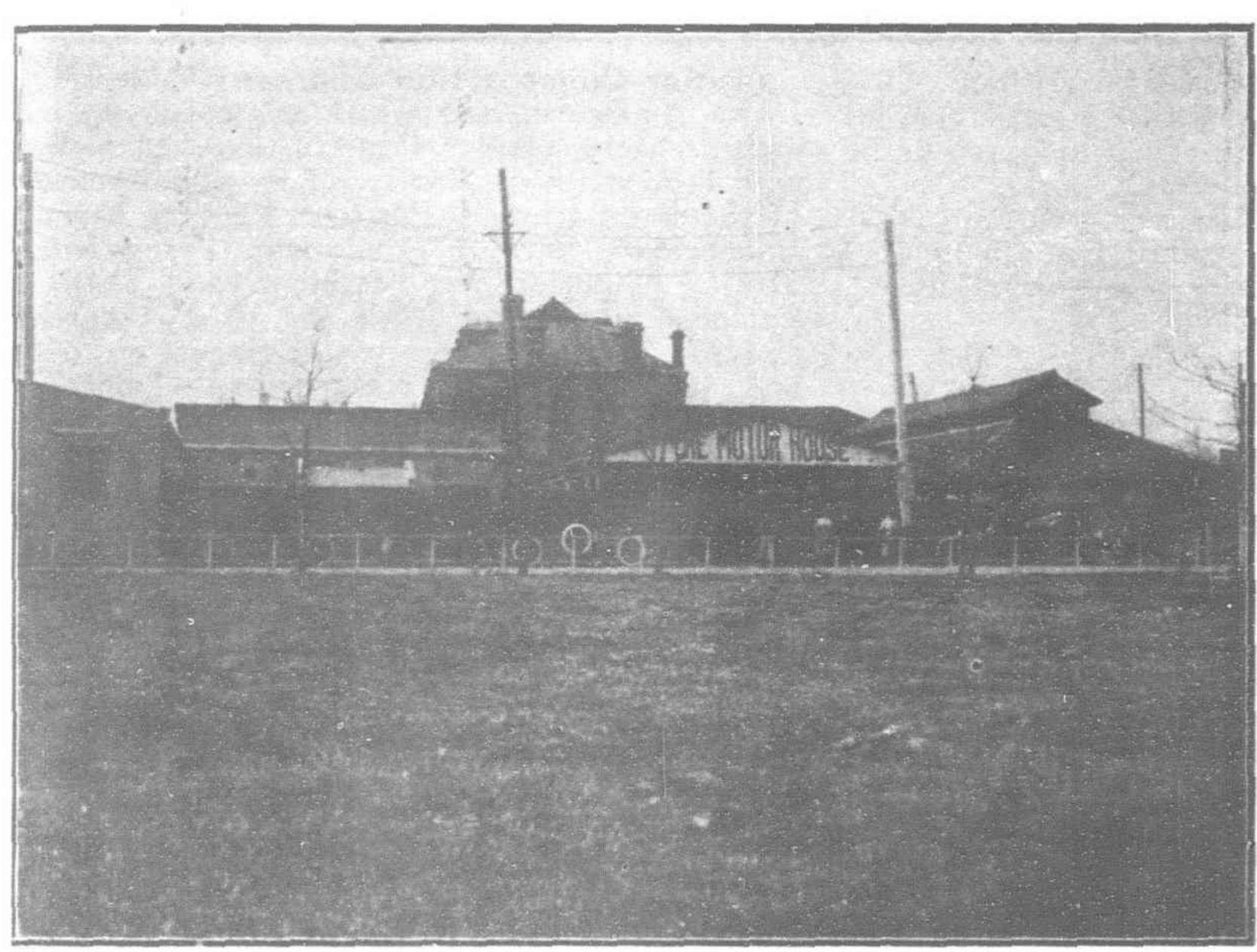
To the foreigner who comes from London or Paris, or New York, or perhaps a small village of America or Europe, this state of affairs is particularly amusing, as well as sometimes aggravating. We have been taught from childhood that if we do not step lively with our eyes wide open when on a public street, we are apt to suffer the penalty, by a hurried ride to the nearest hospital. So it does not behove us to criticise the present generation of city Chinese. They fall comparatively quickly into the ways of the Westerner, and when China awakens in need of good roads, the thousand and one other things that supersede such a movement, will be met and overcome. There will be roads

favorably. A little discussion with him regarding the engine and working parts of his car, discloses the fact that he is much better posted in these regards than the average motor owner at home. On the other hand, the Chinese chauffeurs, who are as necessary an adjunct to a car in China as a steering wheel, usually have not the slightest idea of why they push on this lever or pull on that one, except that they were taught to do so. If a car is unfortunate enough to stall in the country, and after the Chinese driver has taken out the spark plugs and cleaned them, persists in refusing to budge an expression of utter hopelessness comes over his face. But the saving grace is that, being of a mechanical turn of mind, the average Chinese who decides to adopt the driving of a car, can be taught just as much as his European prototype.

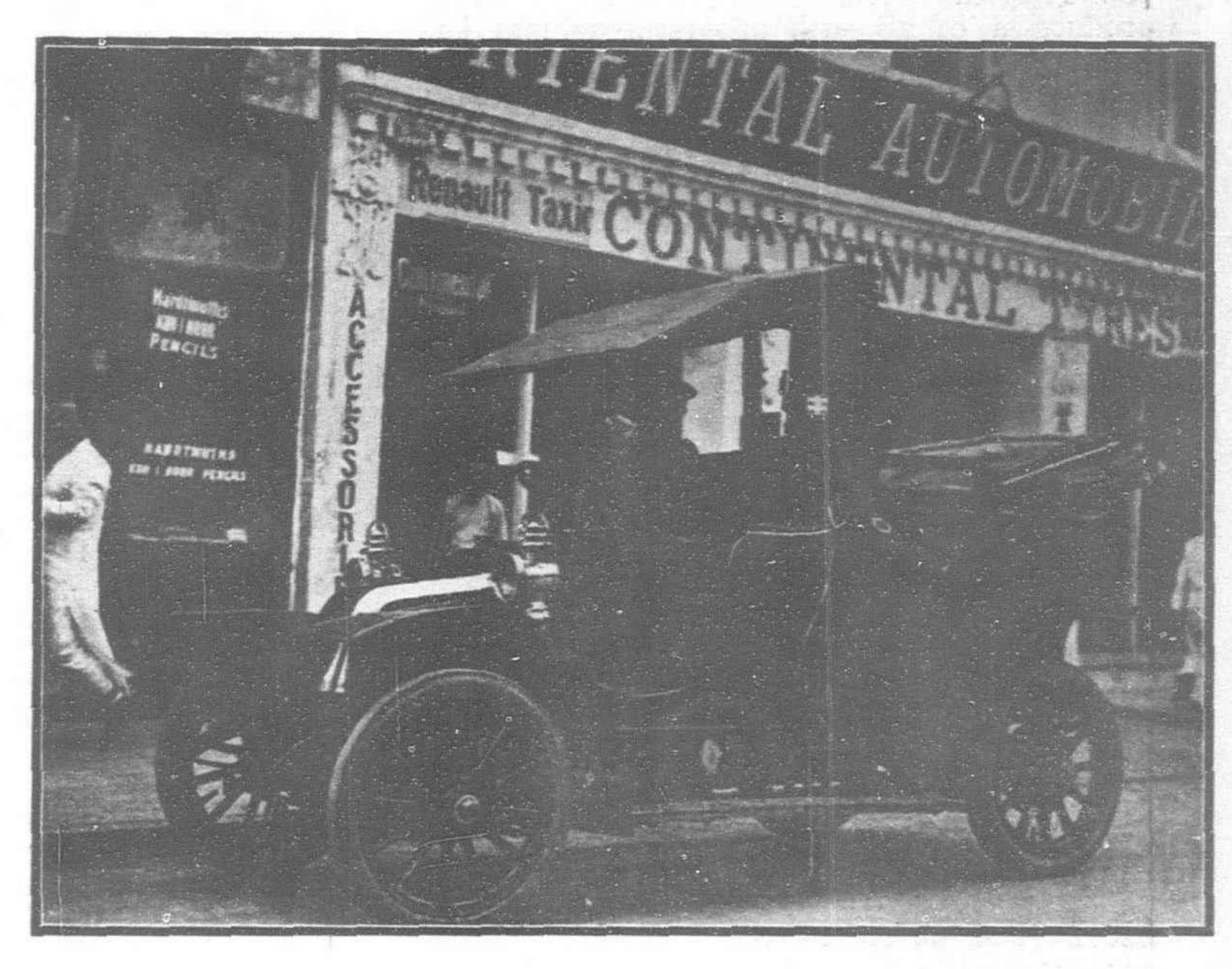
In Tientsin and Peking the automobile is likely to have a big future. The business there is in its inception, and, as an American Consular report says: Up to a year ago there were only about a dozen motor cars in North China. These were owned in Peking and Tientsin, they being the only cities which have improved roads on which cars are available. A little over a year ago a Tientsin importing firm was induced to take an agency for an American motor car. It brought out three touring cars as a trial order. These became popular, and to date the firm has disposed of

A writer in the "Japan Advertiser," commenting on the progress of the automobile business, says, "It seems remarkable that the introducers of the motor car in Japan have thus far escaped serious demonstration against the appearance of this modern equipment for speed and utility, even in the interior points of Japan. There are occasional stories of discomforts experienced by tourists to the interior who have been blocked by hundreds of curious Japanese who declined to grant an easement through their village until they had carefully inspected the "devil wagon," but such experiences occur everywhere.

As a matter of fact the introduction the motor has been surrounded by circumstances that have been most favourable. True, the dealers complain that the Japanese who are gradually taking up the subject, are slow to act and purchase, and prefer to dally long with the transaction than to close it at once. This, however, when viewed with that lack of impatience which is developed in dealers in any commodities by years of experience, has been no serious drawback. And it may be called to mind that within the past six months the field in Japan has been developing fully as rapidly, if not more so, than in any of the other countries, saving France, at the start, although it is pointed out that Japan has the benefit of the development of the manufacture







A SHANGHAI TAXI

and good roads in China one day, and the cars which will be seen running upon them, will be picked from the world's markets as meeting the particular needs of the country. From what nation these cars will come will be decided by the advance made in the meantime by the various countries now manufacturing motor cars. There is no man on the face of the earth, who knows a good thing when he sees it better than John Chinaman, and there is no one who can make a better bargain, so the decision come to by the natives in this regard should be one of great interest to the many nations of the world who are now clamouring at the doors of the Orient for admittance. The Chinaman wants the very best he can buy at the most reasonable figure, and what nation will be the favorite one, time alone can tell.

China, which has always been many centuries behind the Western nations, often proves herself many centuries in the lead in many respects. When a country can change its form of government, from the despotic rule of a Manchu to a Republic, within a few short months, it bespeaks the wonders that may be wrought in this country. There is no room for pessimism in regard to China's future in the automobile business. A talk with a native motor car owner usually impresses one very

16 American cars. This firm also established a garage and repair shop. Seeing its success, a British firm has just established a garage and repair shop, and has taken an agency for a foreign car. There is no garage nor repair shop in Peking. There would be an enormous market for motor cars in North China as in other parts if the country possessed suitable roads. The roads all through North China are simply cart tracts winding over the country, and have no modern improvements. The streets of the native cities, except Tientsin and Peking, are too narrow to use cars. The streets are from 8 to 12 feet wide, without side walks and without macadam or paving. In the foreign concessions of Tientsin and in the newer portion of the native city there are wide, well-macadamized streets, about 50 miles in all. In Peking there is about the same mileage of streets available for motor traffic. including a road to the Summer Palace, 18 miles from the city, and with the advent of a new government under modern educated men the existing roads are certain to be soon extended.

As in China so in Japan. The car has come to stay, though its radius of action is at present much greater in the Land of the Rising Sun, for there the Government long ago discovered the necessity for good roads, and is gradually

of cars, while other countries took it up when the car itself was a crude proposition."

Though Hongkong automobile roads are few owing to the formation of the island there are several cars running in the colony, and with the development of roadways on the mainland, the fever for speedy pleasure is certain to

spread. The Straits Settlements Government has provided magnificent roadways to pierce the entrancing scenery which nature has contributed in the Malay States, and all makes and sizes of cars are in use on them. In addition to the hundreds of private cars in Singapore and throughout the States many auto-buses are running and doing good business. In this connection it may be mentioned that the Straits Motor-bus Co., Ltd., Penang, was able to show a credit balance of \$12,442, as a result of its operations for the year just closed. A final dividend of 10 per cent. was declared, making 40 per cent, for the year, carrying forward \$2,042. The company has now seven 25-seater buses running between Butterworth and Prematang, and between Bukit Mertajam and Kulim.

In Siam also the motor trade has made immense strides and Bangkok can boast, probably, of more cars than any other city in the Far East.

COMPANY REPORTS

Capitalisation of Japanese Companies.— According to an investigation of the Japan Industrial Bank, the capital invested in various enterprises by different companies during the month of June aggregated 71,098,000 yen, of which 59,420,000 yen was for new establishments and 12,578,000 yen for expansion of existing concerns, thereby bringing the total since January up to 416,604,000 yen as detailed in the following table:—

New Establish-

		Expansion. Thou. Yen.	
Industry Gas Electricity Commerce Banking Railway Mining	. 800 . 2,120 . 16,830 . 2,800 . 4,115	6,860 1,650 700 143 3,225 —	37,365 2,450 2,820 16,973 6,025 4,115 150
Agriculture. Total.	. 2,100	12,578	2,100 71,998

New Engineering Company.—A new Company with a capital of ten million yen, is proposed in Japan with the object of providing public hygienic arrangements and the sale and production of all such apparatus as may be required for the improvement and development of fire extinguishing systems in the urban districts and irrigation in the agricultural regions. The company will also undertake various public engineering enterprises, or the necessary investigations for such, in connexion with the construction, repair and improvement of waterworks, drainage, irrigation works, besides sprinkling the streets, boring wells, laying waterpipes for bathrooms and toilet rooms, etc.

Dividends.—The Hongkong Rope Manufacturing Co., Ltd., announce an interim dividend of one dollar per share.

The General Managers of the Hongkong Ice Co., Ltd. declared an interim dividend for the past half-year of two dollars per share.

The United Asbestos Oriental Agency, Ltd., pay a dividend of 15% on ordinary shares, a further dividend of 5% and \$19.80 per share on 100 Founders shares.

Shanghai Cotton Dividend.—The Shanghai Cotton Manufacturing Co. for the year ended June 30, had a credit to profit and Loss account totalling Taels 392,465.15, which is equal to 39.25 per cent on the paid up capital. A dividend of Taels 6 per share was declared, absorbing Taels 120,000 and a bonus of Taels 2 per share absorbing Taels 40,000. The total dividend equals 16 per cent. The report states that Tls. 65,803,55, additional cost of repairs and renewals for the year, has been charged to Working Account. Land, buildings, machinery, and plant are valued at Tls. 1,189,314.30, and stocks of cloth, yarn, cotton, and waste stand at Tls. 868,559.33. The Agents' Commission for the year worked out at Tls. 40,154.18, and the amount transferred from working account to the credit of Profit and Loss totalled Tls. 430,867.11.

Naigai Cotton Trading Co.—The Naigai Wata Kabushiki Kaisha (Home and Foreign Cotton Trading Co., Ltd.), earned a net profit of Yen 244,342.75 for the half year ended 30th June, from which a dividend at the rate of 15 p.c. per annum and a bonus of Yen 36,600, were paid, Yen 50,000 carried to reserve, and Yen 90,583 carried forward to next term. The subscribed capital of the company is Yen 2,500,000 and reserve funds amount to Yen 1,474,800. The total resources amount to Yen 6,815,017. The company has three factories, two of which are cotton spinning and weaving mills in Osaka and Nishinomiya, and the third a cotton spinning mill in Shanghai. Another mill is in course of construction at Shanghai.

Manchurian Flour Mill Co.—The Manchurian Flour Mill Co., Ltd., more popularly known as the Tiehling Flour Mill, because of its principal plant being located at Tiehling, distributed its net profit as follows: Legal Reserve Yen 2,000; Special Reserve Y 3,000; Consolidation Fund and Deprecation Reserve Y 10,000; Bonus to officers Y 3,000; Dividend to shareholders (at the rate of 10% per annum) Y 12,000; Carried forward to the next term Y 9,437.

Hongkong=Canton Steamboat Co .- The directors of the Hongkong, Canton and Macao steamboat Co. reported at the last meeting of shareholders that after paying running expenses, salaries, premia of insurance, repairs and all other charges there remains, including \$22,031.44 brought forward from last account, the sum of \$149,820.03 at credit of profit and loss account. From this amount the directors recommended and it was agreed that a dividend for the half-year of one dollar per share or \$80,000 be paid to shareholders, \$25,000 be written off book value of steamers, \$10,000 be written off wharves, properties and lighters. \$10,000 be transferred to special repairs fund, leaving a balance of \$24,820.03 to be carried forward to new account.

Star Ferry Co., Hongkong.—At an extraordinary general meeting of shareholders in the Star Ferry Co., of Hongkong it was decided to increase the capital from \$200,000 (Mex.) to \$300,000 (Mex.) by the creation of 10,000 new shares of \$10 each. It was also decided that when the reserve fund exceeds \$100,000 portion be distributed as a bonus. The sum of \$100,000 appearing as a reserve fund is to appear in future as capital, that amount having been expended on a new pier on the Hongkong side of the harbour.

The Indo-China Steam Navigation Co .--The report of the Indo-China Steam Navigation Company for 1911 states that the volume of business during the period under review was, up to the time of the outbreak of the revolution in China, the most satisfactory for several years, and that a corresponding improvement in earnings for the year would have been practically assured had normal conditions continued. The revolution, which affected all China carriers alike brought commerce almost to a standstill, and further, the company in particular suffered the additional disturbance of Japanese intrusion on the Calcutta run. The credit side of the revenue account (including £5,683 brought forward and a transfer of £10,000 from underwriting account) amounts to £99,095, and after allowing £53,639 for depreciation, writing off £1,500 from expenses of debenture issue, and providing for all outgoings, there remains £22,407. It is proposed to pay the dividend on the 6 per cent. Cumulative Preferred for the year 1910, and to carry forward £7,531. The Company has acquired a one-third interest in the steamers Luen Yi and Luen Ho, previously run by French competitors on the Yangtsze. The remaining two-thirds are owned by the company's allies in that trade, the China Navigation Company and the China Merchants' Steam Navigation Company. Out of the profits of 1910 (including a transfer of £20,000 from underwriting account) the preferred ordinary dividend for two years was paid, leaving one year in arrear.

Japan Cotton Mills Output.—The returns of the output of the cotton spinning mills of Japan during July show that 107,193 bales of cotton yarn were produced, an increase of 18,653 bales as compared with the corresponding period last year, but a decrease of 7,426 bales or 7% as compared with June. The cause of the decrease in July in comparison with June seems to be that the labor world was largely affected by the hot weather and that all the mills were closed for one day owing to the death of the Emperor. Another reason was that the mill owners have found no necessity to increase production, because export

and home consumption have recently decreased to a large extent so that there remains a great stock of goods waiting to be cleared.

Shanghai Cotton Manufacturing Co.—Last financial year's operations resulted in a net profit of Tls. 392,465.15, which was dealt with as follows:—

To write off buildings Tls. 7,755.10; To write off machinery and plant Tls. 35,865.51; To write off weaving plant Tls. 13,598.19; To write off silk filature Tls. 10,000.00; To write off furniture Tls. 405.00; To pay a dividend of Tls. 6 per share Tls. 120,000.00; To pay a Bonus of Tls. 2 per share Tls. 40,000.00; To set aside as reserve for equalization of dividend Tls. 150,000.00; To carry to new account Tls. 14,841.35. Total 302,465.15.

The Chairman explained that the 1911-1912 China cotton crop was very unsatisfactory both in quality and in quantity, but the bumper yield of American cotton enabled the Co. to make up the shrinkage by the importation of foreign cotton which could be secured at a very reasonable price in consequence of the favour-

able rate of exchange.

To the revolution which made itself evident so unexpectedly in October last, can be attributed that financial stringency from which a few of the dealers suffered, with the result that a certain quantity of yarn was thrown upon the Co.'s hands, but fortunately the loss sustained thereon was not serious.

Insular Construction Company.—Messrs. J. E. Ainsworth and O. F. Campbell have organized the Insular Construction Company with head office in Manila. The capital stock of the corporation is P550,000, P415,000 being fully paid in. Mr. J. E. Ainsworth, is president, Mr. H. Thurder, vice-president, and O. F. Campbell is treasurer, while Mr. W. P. Poland and Mr. E. B. Bruce are the incorporators and directors. This construction company will engage in work throughout the Philippine islands.

TELEGRAPHS, TELEPHONES AND WIRELESS

Dalny Telephone Service.—The work of transferring the telephone lines from overhead to underground in the city of Dalny has been completed in the principal streets.

Telephones at Tsinanfu.—Messrs. Arnold Karberg and Company have signed a contract for the installation of telephones in Tsinan-fu. The magneto system and American plant will be used for the service, which will extend throughout the city.

Japan's Telephones.—A special committee has been appointed by the Japanese Communications Department to make investigations concerning the programme of telephone expansion, the accelerated installation to be adopted in important cities, and the control and running of the telephone service. The project is said to be mainly based in the scheme formulated last year which was rejected from financial considerations; that is, the undertaking to be spread over a period of six consecutive years at a cost of 50,000,000 yen.

Wireless at Zamboanga.—The work on the construction of a new concrete wireless station at Calarian, Zamboanga, has been commenced. Six sets of quarters for the operators and other employees of the station are also being constructed.

When the Philippine wireless bill is passed by Congress there will be constructed at Zamboanga a high power station which will be able to connect with all other stations in south Philippines, and, it is hoped, with Manila. This station will be located in the city, on the lot behind the present custom house.

Anticipating the passage of the bill, the Bureau of Posts is now constructing new wireless stations at Fuerto Princesa and Cuyo.

ELECTRIC LIGHT AND POWER PLANTS

Electricity Company in South Man= churia.-- A private electricity company has been formed with a view to establishing plants at Kaiyuan and Kungchuling, by Mr. T. Saiga, proprietor of the Saiga Electricity Co., Osaka, and others. This company is to be capitalized at Y350,000 divided into 7,000 shares of Y50 each. Messrs. Gonta and Kondo of Tiehling, Messrs. Nova and Kuraoka of Kaiyuan, and Messrs. Miwa and Uyeno, of Kungchuling, are expected to join the promoters. At each plant two generators, each of 75 kilowatts, are to be installed, and to be equipped with a third spare generator. Gas will be used for motor power. The S.M.R. Co. has undertaken to purchase all the necessary machinery, etc.

Hydro = Electric = Plant. — An important Japanese contract has been obtained by Messrs. Dick, Kerr & Co., Ltd., of London and Preston. They have obtained from a Japanese hydroelectric power company what is described as probably the largest order for water-driven alternators which has been placed in Great Britain. The order covers six alternators, each of 7,775 K.V.A. capacity, representing over 60,000 h.p.

Lighting Ipoh.—The Perak Chamber of Commerce have asked the Government to light Ipoh (Federated Malay States) with electricity.

Tsinanfu Electric Light.—The Electric Light Company at Tsinanfu, China, is so short of funds that it is unable to extend its service to many parts of the city, where is has already erected poles and wishes to deliver light. So far as it has inaugurated its service it seems to be very satisfactory. A number of places in the Settlement are using its light, including the German Consulate and the German Bank.

Electric Light at Batangas .- Bevan Montague's electric lighting plant at Batangas. Philippine Islands, has been opened, Mr. Montague has been operating, for some time past, an ice plant, a distilled water plant, and a small electric light plant. The latter furnishing the current for a local cinematograph, also providing the lighting for numerous concrete buildings, including the Batangas opera house. This theater is well fitted, handsomely decorated and possesses a modern stage. Several opera companies from Manila have performed at the Batangas opera house which has a seating capacity of about 2000. The center of interest was the large "Otto" Diesel engine, the first of this kind installed in the islands. The engine is belted to a dynamo which generates sufficient electricity to light up the whole town of Batangas, and to furnish electric light to the buildings of the city.

Lucena Electric Plant Contract.—The contract for the construction of an electric light and ice plant for Lucena, Tayabas, P. I., has been awarded by the Lucena Electric Light, Ice and Water Co., to Messrs. E. C. McCullough and Company. The contract price for the construction is P60,000, the plant to be built upon latest improved methods, the first to be used in the Philippines in that class of construction. Besides furnishing electric lights and ice for the city, the Lucena company will supply the municipality with distilled water. The plant will use crude oil instead of coal, and Crocker & Wheeler generators will be installed. The construction of the electric light plant will begin at an early date, concrete poles will be used, the cross arms will be of steel, as well as the pins, this being a new invention that will be used for the first time in the Philippine Islands. The line will include approximately forty miles of wire to be strung

throughout the town of Lucena, and one hundred Philips lamps, of sixty watt power. will be installed to light the streets. The company has contracts for three thousand incandescent lights to be installed in private houses and government buildings, which will be increased from time to time, and extended should occasion warrant.

Yingkou Hvdro-Electricity Co. — The business returns of the Yingkou (Manchuria) Hydro-Electricity Co., at the end of last month show that the Company sold water to the amount of 280,000 gallons, supplied light to 9,000 lamps, and had 535 subscribers to the telephone service, at compared with 200,000 gallons of water 6,000 lamps, and 448 subscribers at the end of October last year.

INDUSTRIAL PLANTS

Sugar Factory for Formosa.—A plan is on foot to establish a sugar manufacturing company in Formosa, with a capital of five million ven, the promoters being Messrs. Nade, Takashima and other prominent business men. It is said that the new Company will purchase the Noda Sugar Factory at Pinan in Taito province, and the Shingo Sugar Factory at Riryosha in the same province, and instal pressing machines of 500 tons in the Pinan factory and of 700 tons in the Riryosha factory. Business is to be opened from 1914. The area of the sugar cane plantation covers 1,044 kobu at Pinan and 410 kobu at Riryosha, and in 1916 the Company will be able to instal, according to the promoters, another machine of from 750 to 1,000 tons. The Company will be named the Taito Seito Kaisha.

East Asia Tobacco Co.—It is reported that the East Asia Tobacco Co. has selected a site at Shaokangtzu (Chinese Quarter of Dalny) for the construction of a branch factory of its Yingkou plant, and proposes to commence work shortly.

Glass Factory for Dalny.—The Governor General's office in Kwantung contemplates establishing a glass-factory in Dalny for the purpose of meeting the growing demand in Manchuria and North China for glass of various descriptions, such as lamp chimneys, bottles, etc. In starting this undertaking the Kwantung authorities propose to ask business men in Japan Proper to take charge of the new concern, granting them an annual subsidy. It is stated that if the undertaking is successful the authorities, with the help of leading industrial men, propose to establish a large glass-factory in Manchuria.

New Yokohama Enterprise.—The Yokohama Cotton and Hemp Spinning Company organized a short time ago by Messrs. Abe, Tanaka and Tsubai, as promoters, will be the newest of Yokohama industries to get under way at Minami Ota, Yokohama. The installation of machinery has been completed.

Soap Manufacture.—The new works of Messrs. Lever Brothers, near Amagasaki, Japan, are almost completed, and it is believed that in a short time the products of this company, made in Japan, will be on the market.

Tiehling Flour Mill.—The Tiehling Flour Mill Co. has decided to call up Y5 per share for the construction and equipment of the branch factory at Changchun. The laying of foundation for the new factory has already been completed.

Art Glass Plant.—Rosenberg's Inc. have added an art glass works to their business at Manila where they manufacture cathedral and

memorial lead glass windows, art glass domes, and the like. They have also added one of the largest and most up-to-date electroplating plants in the Philippines.

The Gas Works at Dalny have now under installation a new tank capable of holding 350,000 cub. metres. The consumption of gas in Dairen has risen to about 170-180,000 cubic metres per day. The present tank only hold 150,000 cubic metres.

Antung Gas Co., Ltd.—The Antung Gas Co. is about to be organized by a group of promoters including Messrs. Hisayama, Ishihara, and Misaki of Antung, and Messrs. H. Okura, Yamada, Chiba, Nishio, &c., of Tokyo, who hold the consent of the S. M. R. Co. to this new enterprise, and also the concession to serve gas to the Chinese quarter. The company's capital amounts to Y300,000, of which one quarter is to be paid in as the first instalment. The promoters hope to finish the foundation work of the new plant before the end of this year.

Reservoir at Dalny.—It is proposed to build a reservoir behind Osakamachi, Dalny, for street watering purposes, for which 650 tons per day are required. The cost of the reservoir is estimated at Y35,000.

SHIPPING AND SHIP BUILDING

China Press (Shanghai) the Republic will later on own a shipping company of its own. Chang Ji Yung, principal stockholder of the China-Siam S.S. Company is said to have contributed to the Kwangtung Government 70,000 shares of capital stock at about nine dollars each, which that Government will accept and will in turn transfer to the Central Government.

The steamship line at present is valued at about \$2,700,000, it is stated. According to Mr. Yung Hoi, Acting Commissioner of Communications at Kwangtung, if the government finds it profitable, the capital will be increased to ten million dollars. Mr. Yung hopes that he will be able to procure a subsidy from the government for the service of carrying mails. If the government is able to control the company by reason of being a majority holder in the company, it is believed it will eventually own it by taking up the other interests and making it a part of the navy.

The North China Steamship Co. of Dalny, has entered into a contract for the purchase of the French steamer Gins Thun at Y130,000. The steamer has hitherto been working the Saigon-Hongkong route under the Annam Government subsidy. She was built in 1002, and has a gross tonnage of 1.726 tons. She will be used as an auxiliary ship to the Company's steamers Tencho Maru and Saitsu Maru.

Steam Trawler Held up.—The trawler Hoi Fung, belonging to Hongkong and South China Steam Fisheries Co., Ltd., has been laid up in Shanghai on account of opposition by the Republican Government to foreigners engaging in the fishing industry. The question is considered to be one affecting the Chinese Government's fishing rights in her sovereignty as an independent power.

Japanese Steamship Purchases.—The str. Asia of the Russian East Asiatic Fleet has been purchased by Messrs. Iwaki, of Chefoo. The Asia, formerly the Tabor, is of 2,416 tons gross was built in 1890 at Glasgow, with dimensions, 320 × 30 × 20 ft. The vessel will, it is understood, trade on the Gulf of Pechili.

It is stated that the Kishimoto Steamship Co., Kobe, who have recently purchased the Danish str. Siam, and other local companies will shortly be in the market for more second-hand tonnage amounting in all to 70,000 tons.

The Mitsui Bussan Kaisha have recently purchased the British str. Indravelli at Yokohama. The purchase price is stated to be £28,000 sterling. Built in 1897 at Glasgow, the Indravelli is a steel steamer of 4,828 tons gross.

Launch for Borneo.—The steam launch Marlow, which at one time belonged to the Canton-Kowloon Railway, has recently been sold to Messrs. Jardine, Matheson & Co., Ld., for \$13,000. She has had a thorough refit, and is now boarded up and prepared for the long journey to Borneo, which is her ultimate destination. She is to do the voyage under her own steam.

Passenger Motor Boat.-Messrs. J. W. Kew and Co., of Hongkong, have just built a powerful motor boat for the Kwong Sai Navigation Company for their West River service. The new vessel, which will run between Wuchow and Nanning, has the following dimensions: L. O. A. 81 feet, beam 16 feet, draught 3 feet. Accommodation is provided for 150 passengers on a roomy covered deck fitted with bunks; loaded with 25 tons dead weight and with her full complement of passengers and crew, the boat draws only three feet. The motor installation is a six-cylinder set developing 110 B. H. P., and embodying all the latest improvements. It is fitted with magneto ignition, and a self starting device. There are now eight boats on the Wuchang-Nanning run so equipped; the utility of the motor boat for this form of service appears to have been fully established.

The Philippine Yacht .- The chief quartermaster of the Philippine division has awarded to the Hongkong and Whampoa Dock Company the contract for repairs to the Aguila, private yacht of the commanding general of the Philippines division. According to the specifications of the dock company the Aguila will spend the greater part of five months at the dockyards undergoing repairs for which the contract calls. She is to have a new sun deck and deckhouse, new steering apparatus throughout, and a number of other repairs and additions which will put her in first class condition. The longest time will be required in the installation of a patent hydraulic telemotor.

Revenue Cutter.—The governor-general of the Philippine Islands has agreed to the expenditure of P200,000 to build and equip a cutter to put down piracy in the Sulu Archipelago. The design for the vessel has been prepared in Manila under the direction of Acting Collector of Customs J. S. Stanley, who will direct the movements of the ship when completed. The cutter's gross tonnage will be 250 tons and her length over all 140 feet.

Her speed will exceed 16 knots an hour. Her armament will be two Hotchkiss rapid fire guns which will be mounted on the port and starboard sides of the commander's bridge. Besides these in each of the two fast motor boats to be carried in the davits amidships there will be an automatic Colt rapid fire gun mounted on a tripod. The motor boats will be capable of developing an even greater speed than the Cutter and they are to be used in pursuing the sapits when the smugglers endeavor to play their old trick of dodging the revenue officers by sailing close to shore over the huge reefs which make navigation in the Sulu Archipelago a fine art.

Lighter for Bangkok.—The N. D. I., steamer Rajaburi left Hongkong recently towing the second of a number of lighters for Bangkok. The lighter was built by the Hongkong and Whampoa Dock Co. and is a strongly

constructed steel vessel specially built for carrying heavy weights. It has on board a donkey boiler and two powerful winches capable of lifting 15 tons and 5 tons respectively, and will be employed carrying railway material for the new line that is being constructed in that neighbourhood.

The China Navigation Company's coldstorage steamers "Taiyuan," and "Changsha," on the run between Australian ports and Honkong, via Zamboanga and Manila, has been purchased by the Philippine Cold Storage Co.

Manila Dredgers.—An allotment has been made by Acting Secretary Branagan, of Poo,ooo to the port works division of the Philippine Bureau of Navigation which will be used in constructing new steel hulls for dredges Nos. 3 and 7, which have been laid up for a long time because of the unsafe condition of their bottoms. Work will be undertaken immediately by the Bureau of Navigation to place the two dredges in commission, and they will be added to the fleet now at work as soon as repairs to them are completed. These two additional dredges will enable the Bureau to make more rapid progress toward placing all the navigable esteros in first class condition, the fleet now available not being sufficient to handle all the work required of it.

BUILDING

Boom at Dalny.—The building boom at Dalny is commented upon by Mr. K. Inouve, Manager of the Yokohama Specie Bank, at Dalny. He says that the boom is due to the enforcement of building regulations, which expressly provide for the cancellation of the existing lease of lands unless building work be started within a specified period. Taken as a whole about 20% of the buildings of Dalny are untenanted. It is said that the total investments put into new buildings since the beginning of this year amounts to ven 1,300,000. Mr. Inouve says: "The excess of supply of buildings to let is bound to have the effect of causing a sort of anemia in the economic organism of Dalny, which will bring a business depression in its train. On the other hand, the houseowners themselves will not be able to find always desirable tenants for their buildings,"

The new buildings for which permits were applied to the Dalny Civil Administration from the beginning of this year to June 23rd last numbered 188 for Dalny, 119 for Shaokangtzu (Chinese Quarter), and 5 for the suburbs, making the total of 313.

Bureau of Supply Warehouses.—To provide proper support for the Bureau of Supply Warehouses at Manila 9,000 piles are to be driven at a cost of P200,000. This will entail a delay in the completion of the Bureau of Supply building of about two years. Careful test of the piling has been made by the use of an electric driven pile-driver, which power will be utilized in carrying out this particular work.

New Provincial Capital.—As San Isidro will be abandoned as the provincial capital of Nueva Ecija, Philippine Islands, and the seat of the provincial government will be moved to Cabanatuan, which is more centrally located, the Governor-General has authorized a loan of P70,000 from insular funds to the province of Nueva Ecija, for the construction of a provincial capital, jail, school, and other structures required for provincial government purposes. Ten hectares of ground has been set aside in the town as sites for those buildings.

Taal Observatory.—The buildings for the Taal Observatory to cost P10,000, which are being constructed by contractor Murphy, will be completed in September and will be ready for the reception and installation of the apparatus when it arrives.

Some of the instruments are the latest inventions in seismic apparatus, and have

never before been used in this part of the world. An observer is now stationed on Taal volcano, but the instruments used there at present are smaller and not as delicate as those to be installed.

One of the greatest difficulties in the erection of the new building has been the condition of the road from Tanauan to the shore of the lake. Father Maso recently made a trip to the volcano, taking some instruments down to the temporary observatory, and states that, instead of a three hour trip, as it should be, it was two days trying journey.

Hospital for Manila.—Over P40,000 out of the P70,000 required for the Spanish Hospital for Manila having been obtained a site has been secured on Calle Sandejas and the foundation stone has been laid by the Acting Governor-General.

The plans call for the erection of one main building and three wings, the ground floor of frame construction. There will also be two detached buildings for the care of infectious and contagious diseases, and the equipment throughout is to be of the most modern kind. The hospital is to be in charge of Dr. Martin and Dr. Diaz Perez, and the governing body is composed as follows: Enrique Brias, president; Trinidad Jurado, Martinez Romero Salas, Carvero Elizaldo Irueta, and Goyena Varguera, directors.

New Warehouses at Pandacan.—A large tract of land has been purchased in Pandacan, Manila, by Messrs. Germann and Company for the sum of P 20,000

the sum of P 30,000.

This sale is deemed important as indicating a movement to center the export warehouse business in the district bordering the river and accessible by the branch line of the Manila Railroad Company now being constructed to parallel the river. Stevenson and Company have already erected a large concrete warehouse and Germann and Company expect to begin the construction of their building in the near future. It is estimated that the cost of building has in this manner been reduced some fifty per cent and another great saving will be the ability to handle cargo independently of the government piers.

A modern apartment house to cost in the neighborhood of P65,000 is to be crected in Ermita between Calle Salsipuedes and Nueva, Manila. Plans have been already submitted to the city engineer. There are to be 12 apartments in the building which is to be four stories high. Concrete floors will be laid.

Plans for the construction of the main tank for the Manila gas company have been approved. The tank is to be 24 meters in height and 30 in diameter. Over 600 piles will be sunk for the foundations. The tank is to have a pressure of 15,000,000 pounds.

HARBOUR WORKS, CANALS, IRRIGATION AND WATER WORKS

Proposed New Port.—Merchants in Hong-kong propose opening Chinglang as a commercial port. They propose to start with a capital of \$1,000,000, and have secured the consent of the Tutuh of Kwangtung to the scheme.

New Signal Station at Dalny.—The construction work on the Signal Station No. 2 at the northern extremity of East Breakwater, Dalny, has almost been completed. It stands 130 ft. high above the base, being 90 ft. higher than the Signal Station No. 1 at the northern extremity of Main Quay.

Tokyo=Yokohama Canal.—The first calls on the promoters' shares of the Tokyo-Yokohama Canal Company having been paid up, allotment of the shares is being made. A representative of American capitalists, who came to Japan some time ago to investigate conditions, is said to have expressed himself as satisfied with the future prospects of the proposed canal, and repeatedly signified his willingness to participate in the enterprise. Negotiations are to be opened for the introduction of American capital.

Filters for Shameen.—The Shameen (Canton) Municipal Council is installing filters by the Candy Filter Company. The foundations are now being built.

Improving Zamboanga.—Plans for the improvement of Zamboanga (Mindinao, P. I.) harbor, are being prepared, the estimated cost of the work being P800,000. It is understood that the port plans proposed include the construction of a sea wall and the dredging of a basin deep enough to receive the largest vessel and give it anchorage. The material dredged will be utilized, as in Manila, to construct a port extension which will be developed along the same lines as in the capital city. The reclamation will be devoted to wharves' storage sheds, warehouses, etc., and the wholesale district will ultimatily be located there.

The first-stage of the work, if approved, will be confined to the dredging and mapping out of a reclaimed area. Then will follow the construction of wharves. The main difficulty will be the financing of this project and it is not improbable that only the initial work will

be undertaken this year.

Tarlac Irrigation Contract.—The Insular construction company has secured the big Tarlac irrigation project contract.

The amount bid by the winner was close to P406,300 and the work of construction is to commence as soon as the necessary materia! can be secured from the States. There will be about 12,000 cubic meters of concrete work and 10 miles of piling, 5 miles of the latter being wooden piling, for which lauan, one of the native woods will probably be used, while the other 5 miles will be of steel piles, which will have to come from the States. There will also be about 80,000 kilograms of reinforcing steel used in the job. The larger part of the main ditch is already built and the contract of the Insular construction company is for the 3 kilometers at the upper end and for the head works, the company also putting in the dam, dikes and protective works generally. The main ditch is 12 kilometers in length and there will be 4 or 5 main lateral feeders. The water comes from the O'Donnell river and the whole system, when completed, will irrigate the lands of the Compania General de Tabacos, the said company to pay a stipulated sum per hectare for the use of the water and to have right, at the end of ten years, of purchasing the system from the government at the original cost of construction.

The construction of this huge irrigation project will be in charge of the irrigation division of the bureau of public works, which will have an engineer on the job continuously

to watch the government's interests.

Reclamation at Dalny.—The South Manchurian Railway Co. is entering upon a reclamation scheme at Dalny to cost yen 800,000. The land reclaimed will be used for warehouses and storage grounds for goods. A basin 900 feet long by 200 feet wide will be provided for junks, boats, etc.

Water Supply for Siquijor.—Lieutenant-Governor James R. Fugate, of Siquijor island, who has been handling all construction projects on the Island of Siquijor, a subprovince of Oriental Negros, P.I., has practically completed a gravity system for Canoan, Siquijor island. The water of several small springs was collected into one large reservoir and brought into the municipality by means of a 2½-inch

pipe line. A circular fountain in the center of the town serves the whole population and eliminates the 2-kilometer walk which was previously necessary to secure potable water.

A second and more important water system has been constructed by Lieutenant-Governor Fugate in the town of Siguijor on the island of the same name. An allotment of P18,000 of Insular funds was secured for the purchase of material only, the municipal officials guaranteeing to receive the material at the ship's side and to do all the work necessary for the installation of the system. The municipality carried out its promise to the letter and constructed a main line of 4-inch and 3-inch pipe for a distance of 4 kilometers from the spring to the town, and also a distribution system which supplies all the population for 4 kilometers east and west of the town. Lieutenant-Governor Fugate has made some excellent original designs for reinforced-concrete fountains, which have drinking troughs for horses and cattle and smaller troughs for the smaller animals, places for washerwomen to work, and a private bath at each fountain. These fountains are located about I kilometer apart east and west of the municipality.

Cebu Province Schemes.—The plans for a new project, the construction of waterworks for the municipality of Pılar, Camote Islands, Province of Cebu, P.I., have lately been forwarded by the district engineer. The population to be supplied is about 1,000; the capacity of the spring is about 20 gallons per minute and the per capita supply is 28.8 gallons per twenty-four hours. The distance of the spring from the town in approximately 1.600 meters, with an elevation of 12 meters. The distribution system plan consists of 1-inch and 1½-inch pipes and the estimated cost of the project is P12,480. The municipality has requested a loan from the gold-reserve fund in

order to assist in this work. Another project is the construction of a water-supply system in the municipality of Carcar, Province of Cebu, to supply a population of 5,000. The capacity of the spring is 28 gallons per minute and the distance of the spring from the town is 3,100 meters, with an elevation of 18 meters. The plan calls for a circular reinforced concrete covered storage tank having an inside diameter of 5.6 meters with an elevation of 13,400 gallons from the night run-off of the spring. The main pipe line from the storage tank to the town is made up of 31/2-inch pipe capable of delivering 60 gallons per minute into a distribution system composed of 11/2-inch and 3-inch pipes. The estimated cost of the completed work is P20,000 and the municipality has requested a loan from the gold-reserve fund to execute this work.

The municipality of Naga, Cebn Province, has requested the district engineer to investigate and prepare plans for a water-supply system. These plans have just been submitted to the Director of Public Works for approval. The population to be supplied is approximately 5,000. Two springs, 1,200 meters apart, have been connected and the discharge is through a 11%-inch pipe line 300 meters long into a circular reinforced concrete covered storage tank of 5 meters inside diameter and 2.8 meters in height, capable of receiving 13,000 gallons during the night. The elevation of these springs is 77 meters above the town. The main pipe line consists of a 2-inch pipe which is 1,430 meters in length; distribution system of 11/2-inch pipe. The estimated cost of the system is Po,000 and the municipality has requested a loan from the gold-reserve fund for the execution of the work.

Another project in Cebu Province is the Tudela water-supply system. The municipality of Tudela in Camote Islands is isolated on a small island 30 miles from Cebu, and the success of the San Francisco water system in the same group of islands has encouraged them to request a similar supply. The source of the supply is a spring 1,700 meters from the municipality, with an elevation of 155 meters. The discharge of this spring is 23 gallons per minute. As wrought iron pipe should not be subjected to a pressure of 100 pounds per

square inch, it was decided best to construct a small distribution tank near the town, with a sufficient head to give all the necessary pressure for the distribution system of 1½-inch pipe line, without valves so that no heavy pressure would result in the line. The estimated cost of the system is P 4,500 and the municipality has requested a loan from the gold-reserve fund for this project.

The municipality of Sibonga, Province of Cebu, has also requested a loan from the goldreserve fund for the construction of a gravity water system. The population to be supplied is estimated at 6,000. The spring from which this supply is to be secured is 4,300 meters from the town, at an elevation of 90 meters, and has a flow of approximately 44 gallons per minute. The plans call for a circular reinforced concrete covered storage tank. From the spring a 3-inch pipe will deliver water into Sibonga through a 2½-inch and 1½-inch distribution system. One hydrant will always be kept open in the municipality to cut down the pressure on the main pipe line. The estimated cost of this project is P20,000.

The district engineer of Cebu has also submitted plans for the construction of a water system in the municipality of Argao, Province of Cebu. This system is very similar to the design of the system for Carcar and Sibonga, described above. The main spring is 4,700 meters long and consists of 2½-inch wroughtiron pipe discharging into a 2-inch and 1½-inch distribution system, The storage tank will have a capacity of 9,600 gallons. The estimated cost of this project is P20,000. A loan has been requested by the municipality to

execute the work.

The district engineer has also submitted plans for a water system for the municipality of Catmon, Province of Cebu. The spring is located 1,700 meters from the town at an elevation of 42 meters. It has a flow of 25 gallons per minute. A circular reinforced concrete covered storage tank of 15,000 gallons capacity will be located near the spring. The main pipe line will consist of 2½-inch wroughtiron pipe and the distribution line will be a 1½-inch pipe. The population to be supplied is estimated at 1,500, and the estimated cost of the system is P6,650. The municipality has requested a loan from the gold-reserve fund for the construction of this system.

The construction of municipal water-supply systems is doing more than any other one thing toward bringing the municipal authorities and district engineers together in the performance of public works in the various provinces.

Water Works for San Pablo.—Complete preliminary investigations and plans for the installation of a gravity water system for San Pablo, La Laguna, P.I., have been made. The sources of water for the system investigated and approved are springs about 6 kilometers east of San Pablo at the foot of the San Cristobal mountains. The estimated cost for the system complete in P81,000, and it is calculated that it will supply a minimum of 750,000 gallons per day. This supply will afford ample fire protection and sufficient water for all other purposes for many years to come. It has been recommended that a loan be granted the municipality for the partial construction of this water system.

Artesian Well at Wright.—The artesian well division, of the Bureau of Public Works. drilled a well in the town of Wright, Samar, P.I., that was sunk to a depth of one thousand and fifteen feet, and is cased with four and one half inch diameter steel drive pipe. This is the first time in the history of the Philippine Islands that good water had been obtained in any part of the islands at a depth greater than eight hundred feet. The flow of the well is rather small being only one and one half gallons per minute, but the water rises to a heigth of forty feet above the ground without diminishing the flow, making it possible to erect a tank or reservoir to receive the overflow, none being wasted. Pumping at the rate of ten gallons per minute lowers the water to twenty feet below the ground level. In drilling this well slate without bearing formation was drilled through to a depth of nine hundred feet, at which point sandstone of a close grain variety was encountered. No water of any kind was found between nine hundred feet and one thousand and fifteen feet, at which point the flow was obtained. The water is of excellent quality, and while the amount produced is small it is sufficient to supply the inhabitants of the town of Wright, Samar, if economy is used. The machinery that was used in drilling this well is now being moved to Sumarraga Island, near Wright, Samar.

RAILWAYS

Moscow-Peking Railway.—The Koelnische Zeitung reports from St. Petersburg that Mr. Kokovtzev, the Russian Premier, has examined plans for the construction of the Moscow-Peking Railway and promised to guarantee the interest on the capital needed for its construction.

Two alternative routes are spoken of in

connection with this route.

According to the plan, one of them, which may be called the Northern line, would utilize the present Siberian line as far as Tcheroniginsk or Irkutsk, and also a part of the Baikal line runs to Kiakta, whence it will proceed to Peking, via Changchiakow, passing through Mongolia. The line is the shorter of the two, the total length being about 1,200 (Russian) miles. The construction of a railway connecting Changchiakow with Kiakta was projected and suggested to the Russian Government by General Torunisin two years ago, but the suggestion

was not accepted by the Government.

The other line, or the Southern line, provides for an entirely new construction. Starting from Moscow the line will reach Semipalachensk, viå Suizuran, Samala, and Orenburg, and running Northward from Semipalachensk, taking a course parallel with North Latitude 50, will reach Kiakta traversing through the Mongolian plain, then going to Peking via Changchiakow. The construction of the line involves great difficulties and immense expense, it being necessary to develop a new route in the waste land and the Gobi desert. It is also necessary to construct a new trunk line between Moscow and Semipalachensk utilizing a portion of the Orenburg-Tashkend Railway. That line alone extends for about 2,500 (Russian) miles, about one-third of the entire mileage between Moscow and Peking. In addition the line between Semipalachensk and Kiakta covers 3,000 (Russian) miles and that between Kiakta and Changchiaknow 1,200 (Russian) miles.

These two lines were at first strongly opposed by the Russian Government, but in consideration of the report that the land survey of the projected railway has been already started, it is probable that an understanding has been concluded between the Russian Government and the American-German syndicate, perhaps

adopting the Northern line.

It is also reported that the Chinese Minister in St. Petersburg has had some connection with

the project from the beginning.

Effect of the Yunnan Line.—A correspondent at Yunnan writes as follows: The advent of the French railway giving the people of Yunnan direct access to the sea at its nearest point, and the constant contact and unremitting pressure that the railroad supplies as between an enterprising people on the one hand and a phlegmatic unwilling population on the other, one can easily see how the whole situation has been modified and complicated by the coming of the iron road. This province promises to become a bone of contention both politically and commercially—just now French, British, German and to some extent American firms are competing for and urging on the Chinese the rival merits of their respective houses for the supply of equipment for projected railroads, mines, etc., and needless to say it places the Chinese in a very embarrasing position. There are rumors of a small French loan having been

made to ease the financial pressure at one point, but it is so small as to be of little use to any scheme of development. Just at present the railroad is suffering from its usual summer complaint; the mountains have commenced their annual campaign against the road and traffic is much interrupted. The cost of maintenance is a formidable item in the operation of the railway, especially as most of the hills are quite bare of trees and most of our year's rain falls in a brief space during the summer. The erosion is very great and tends to demoralise the railway schedule for the summer months.

South Manchuria Railway.—The South Manchuria Railway Co's, gross receipts for the half year ended March 31, amounted to Y 16,701,912.867, which, when compared with the receipts of the corresponding term during the previous year, shows an increase of Y 1,335,469,014. The total amount paid out by the Company was Y 13,290,373.391, which is also an increase of Y 999,253.538 over the disbursements made during the same term of the year before. From this, it will be seen that the Company's net profit amounts to Y3,411,319.475, an increase of Y 336,215.435 over the gains acquired during the corresponding six months a year ago. Below is given a statement of profit and loss of the Company for the present term.

RECEIPTS.

Railways	Y. 11,202,163.
Ships	217,068.
Mining	3,402,756.
Harbor	716,581.
Local	230,102.
Hotels	112,102.
Electricity	400,400.
Gas	81,764.
Miscellaneous Profits	62,175.
Interest	1,778,787.
Total	16,701,912.
	14
DISBURSEMENTS.	
Railways	Y. 3,585,051.
Ships	261,420.
Mining	2,265,356.
Harbor	619,140.
	564,327.
Local	
Hotels	140,268.
E, lectricity	321,734.
Gas	46,730.
Miscellaneous expenses	1,610,461.
General expenses	923.385.
Interest	2,724,555.
Difference on the face value of	
debentures and the actual	
amount received	170,023.
Total	13,200,373.

Electricity on the Karuizawa Line.—The electric generating stations and other necessary buildings, which have been in course of construction by the Eastern Lines Superintendence Office of the Imperial Railway Bureau, with a view to running trains equipped with electric locomotives over Ushi pass, on the Shinetsu line, have been completed.

S.M.R. Traffic Returns.—The South Manchuria Railway Traffic Returns for the month of July give the daily average of Y 35,217, being an increase by Y 8,569 over the corresponding period of last year.

New S.M.R. Box Cars.—Sixteen box cars, completed at the Shahokou Railway Workshops at the end of last month, passed a trial operation, and will be brought into service for the transportation of Beans on the advent of the new Bean Season.

S.M.R. Locomotives.—Two railway locomotives were completed at the Railway Workshops at Shahokou on August 3. They passed a trial

run to which they were subjected later. This has raised the total number of the Company's locomotives to 256.

Canton Hankow Line.—The Civil Governor at Wuchang has held a conference with the leading members of the Hupeh Government at which it was decided to instruct the Hupeh Government Bank and the Railway Bureau to give a detailed report of the funds collected from the merchants and rich families as shares for the construction of the Canton-Hankow Railway and the Szechuan-Hankow Railway. They will be also asked to give a report of the lands bought for the line of the railway. A list of all the members of the old staff of the Railway office will be delivered to the New Railway Office so that they may be examined and employed if suitable.

The Canton correspondent of the "Hongkong Telegraph" writes that Mr. Tam Yun Fung, Director-in-Chief of the Canton-Hankow Railway, intends to divide the whole length of the line into three sections, on which work will be commenced simultaneously. The first section will be from Wuchang to Ngokchow; the second section from Ngokchow to Wingchow; and the third section from Wingchow to Canton. Mr. Ching Ming-chiu will be appointed manager of the first section; Mr. Chau Yau-loong, manager of the second; and Mr. Jim Tin-yau, manager of the third section, in addition to his duties

as Deputy Director-in-chief of the Railway,

which latter appointment has just been announced.

Mukden = Itungchou Railway.— The old scheme of connecting Mukden by railway with Kirin, via Hailungcheng, Itungchou, and Shuangyangho, has been revived by Chairman Liu, of the Chinese Guild, Kirin says the "Manchuria Daily News." The Chinese Guild has approved of this scheme, and the share capital is open for public subscription. The promoters wish to take up first the Mukden-Itungchou section with the object of building a branch line from Itungchou to Changchun. Their idea seems to be to attract to their railway the Chinese passenger traffic from Changchun which is only 30 miles from Itungchou.

Tokyo-Shimonoseki Express.—The inauguration of the Limited Express Trains between Tokyo and Shimonoseki has been a popular departure on the part of the Imperial Japanese Railways. The new service was started in June. The trains leaves the Shimbashi station at Tokyo at 8.30 every morning and arrive at Shimonoseki at 9.38 the following morning. They leave Shimonoseki at 7.10 p.m. each day and arrive at Tokyo at 8.25 p.m.

the following day.

The seven cars of which the new trains consist comprise a mail and beggage car, second-class cars, a second class sleeping car, a dining car, a first-class passenger car, firstclass sleeping car and observation car. Generally speaking the new express may be called Trains-de-Luxe, leaving nothing to be desired in point of appearance, equipment, and accommodation. The dining cars, and the observation cars are particularly noticeable, the former being far larger and more roomy than those hitherto used in Japan and the interior conspicuous for the thorough improvement effected in every detail that may add to the comfort and convenience of passengers. The observation cars are for the use of first class passengers only, and consist of three sections, namely compartments for passengers, the library, and the compartment for the purposes of observation. This last section is provided with upholstered wicker chairs and smoking tables, etc. With large clear window panes, on each side, the car gives a most satisfactory view of the country through which the train passes. The carved wood ceilings, the electric lamps in the shape of Japanese lanterns, and the paper-screen like ventilating windows—all these give the cars a peculiarly Japanese touch.

It may be added that each carriage of these new Expresses, of which there are five for

service at present, was constructed at cost of from Y. 10,000 to Y. 18,000.

Proposed Peking Tramway.—A foreign firm has arranged to advance the Chinese Government eight million marks in one year in return for a concession of the right to construct a tramway in Peking costing the same amount. It appears that a Chino-foreign company will be formed under the direction of prominent Chinese. It is understood that the Peking tramway scheme provides for the construction of lines outside Peking. A scheme for the construction of lines inside the city is under consideration.

Burma-Szechuen Line.—A resident of unnan gives the following as the reasons for the occupation of Pienma by the British. In an interview published by the "China Tribune" he is credited with saying: "Several years ago, Great Britain acquired the concession for the Yunnan-Burma Railway. But owing to the very difficult engineering work to be encountered on the section between Bhamo and Tengyueh via Nungchang on account of the extraordinary mountainous nature of ground, she was desirous to obtain a new line to reach Szechuan by crossing through Yunnan Province. With this in view she was exploring the border line to see if she could find any likely place from which she could stretch her projected line with less difficulties. She soon discovered that the construction of a railway from Michina, the northern terminus of the Burma Railroad to Pienma, could be carried out with comparative ease, and that it would prove to be far more advantageous on both financial and economic relations than the projected Tibet-Szechuan Railway, which is to be stretched across Tibet to Chengtu via Yatung. Thus situated, she took hold of demarcation question, but her real idea is to abandon the Yunnan-Burina Line, and start one from Michina to Pienma, and thence stretch it to the capital of Szechuan, via Yunnan Fu, or from Pienma directly to Chengtu Fu."

Baguio Line .- The work of the Manila Railway Company is being pushed on rapidly. Over 900 men are now employed at the Baguio end, from where more than six kilometers of grade have been completed towards Aringay, on the coast. At the Aringay end 1,200 men are working. Hydraulic streams from the Irosen river are being used to cut down the dirt grade, the power being supplied by little giant hydraulic pumps. The main tunnel of this line has already been driven 50 meters into the cliff. From Aringay toward San Fernando the road is nearly completed, in fact the trains are running through to the Bauen river, and from there a perfect automobile road is available to the latter town. The Bureau of Public Works is arranging to run an automobile line over this section, as soon as the railroad gets the first train to the river.

Light-Rail Over Tumenling Pass.—The construction of a light-rail line winding up and down Tumenling Pass on the Kirin-Changchun Railway is now ready for service. The rapid progress has been made possible by securing from Tientsin a gang of 200 skilled hands, in order to re-enforce the 600 regulars which have been put on since the plan of building the line was adopted last spring.

Proposal to Bridge Johore Strait.—The Federal Council (Malay States) has approved the appropriation of \$12,000 to meet the cost of the borings and other preliminary investigations for the construction of the proposed bridge over the Johore Strait. The Chief Secretary said that the Government was not committed to such a project but it was worthy of consideration. He estimated that the cost would be about \$3,800,000. The proposed bridge was a very necessary addition to the railway system of the Federated Malay States. At present there was much delay in bringing goods up

from Singapore. If there was a bridge it would be possible for goods to be loaded at the docks in Singapore, and brought straight to the Federated Malay States. The total additional cost, including a diversion and raising of the line, would be \$4,100,000.

Federated Malay States Lines.—The General Manager of the Federated Malay States Railways (Mr. P. A. Anthony) reports a highly satisfactory working of the railways during the past year. A striking feature was the great increase in the number of passengers carried—10,347,896, as compared with 7,262,830 in 1909, an increase of 42.47 per cent. in two years. Goods traffic increased from 653,663 tons in 1910 to 780,780 tons in 1911, or 19.4 per cent. of increase. These increases have taxed the capacity of the rolling stock to its utmost limits, and a large programme for additional stock will be necessary to enable the management to keep pace with the development of traffic. The gross earnings from all traffic increased by 20.28 per cent., working expenses by 4.3 per cent., and the net earnings by 45.9 per cent. The dividend earned was 6.03 per cent., being the highest since 1903. There is a total of 559 miles of line open to traffic, and with the Johore and Singapore lines there is now a total of about 700 miles of railway lines in the Malay Peninsula. This will be added to during the current year, as the extension of the line through Pahang is being pushed on in order to carry the system through the State of Kelantan to the Siamese frontier. The capital account of the open lines in the F.M.S. (inclusive of motor services) now stands at £6,383,217, an increase of £341,741 over the previous year. A portion of this was expended on the new passenger station at Kuala Lumpur, the capital of the Federation, where there is now a fine station hotel. New restaurant cars. fitted with electric lights and fans, were added to the rolling stock, as well as additional rolling stock for the night service to Singapore, night travel being a new feature in Malaya since the completion of the line through Johore. These sleeping saloons and dining cars will bear comparison with those in use on any other railway. The capital account of lines under construction and surveys amounted to £507,928 on Dec. 31, 1011, and though the major portion of this sum was expended on the Pahang-Kelantan extension it may be mentioned that a portion was spent on surveys of a route on the West Coast carrying a line from Province Wellesley into the State of Kedah. The gross earnings from all sources, including motor services, amounted to £823,513, or an increase of £138,854 over 1910; and the gross working expenses were £440,698, as against £422,500 in 1010.

Indian Railway Profits.—In the administration report on the railways of India for 1911, it is stated that during the year there were 755 miles of line opened to traffic, bringing the total open mileage up to 32,839 miles. There were also 841 miles of lines sanctioned, and at the end of the year 263.78 miles were under construction.

The actual capital outlay, excluding premia for the purchase of companies' lines from the commencement of operations on all open lines, amounted at the close of the calendar year 1911 to Rs. 45,006.80 lakhs and that on lines under construction to Rs. 955.48 lakhs. In addition, Rs. 130.12 lakhs were incurred on miscellaneous items, English stores, &c., connected with railways. The total outlay amounted to Rs. 46,092.40 lakhs. The actual expenditure on open line rolling stock and on other open line expenditure during the year 1911 amounted to 351 lakhs and 573 lakhs respectively.

The fullest details are gone into in the report, but a summary of the earnings, showing the financial result to the State during the year 1911, after meeting, in addition to the expenses of working, all charges for interest on capital outlay by the State and on capital raised by companies, also annuity payments connected with the purchase

of railways by the State, was a net gain of Rs. 406.94 lakhs (£2.71 millions). This result, however, is arrived at after inclusion in the charges against revenue of a sum of Rs. 135.63 lakhs (£904,000), representing the portion of annuity payments in redemption of capital. Omitting this item, which is not properly a revenue charge, the true result for the year is a net gain of Rs. 543 lakhs (£3.62 millions). The gross earnings of all Indian Railways amounted in round figures to Rs. 5,527.92 lakhs, compared with Rs. 5,114.22 lakhs in 1910. The net earnings amounted to Rs. 2,644.00 lakhs, against Rs. 2,398.50 lakhs in 1910. These net earnings yielded a return on capital outlay of Rs. 45,006.80 lakhs on open lines—i.e., on mileage earning—a revenue of 5.87 per cent., as eompared with 5.46 last year.

Regarding passenger traffic, the total number carried was 389.85 millions, against 371.58 millions, and the earnings therefrom amounted to Rs. 1.849.08 lakhs, against Rs. 1,712.04 lakhs. The number of third-class passengers carried was more by 16.02 millions and the earnings therefrom by Rs. 107.99 lakhs. The increase of Rs. 137.04 lakhs in the passenger earnings was contributed chiefly by the North-Western Railway (Rs. 26.84 lakhs), the East Indian Railwap (Rs. 16.08 lakhs), the Great Indian Peninsula Railway (Rs. 12.35 lakhs), the Bombay, Baroda and Central India Railway (Rs. 10.03 lakhs), the Eastern Bengal Railway 3 ft. 33 in. gauge section (Rs. 9.20 lakhs), the Oudh and Rohilkund Railway (Rs. 8.69 lakhs), and the Rajputana-Malwa Railway (Rs. 8.56 lakhs), and was due to the development of traffic and to the Coronation Durbar, held at Delhi.

The aggregate tonnage of goods moved during the year 1911 was 71.27 millions of tons and the earnings therefrom were Rs. 3,293.32 lakhs, an increase over the previous year of 5.67 million tons and of Rs. 250.15 lakhs in earnings. Of the increase in the goods receipts the East Indian Railway contributed Rs. 48.05 lakhs, or 19.21 per cent. and the North-Western Railway Rs. 36.69 lakhs, or 14.67 per cent., while remainder was contributed principally by the Bengal-Nagpur, the Great Indian Peninsula, the South Indian, the Bombay, Baroda and Central India, and the Rajputana-Malwa-Railways.

The number of passengers killed from causes beyond their own control was 0.03 per million of passengers travelling, which gives an average of one in 1,197.74 millions of miles travelled.

Shanghai Nanking Railway.—The half-year ending June, 1912, was a prosperous one. The earnings totalled \$1,407,000, whilst the working expenses stood at \$821,000, the net earnings thus being \$586,000. For the 33 weeks ended August 17 the figures stood as follow:

Year.	Passen- gers.	Goods and Sundries.	Total.
	\$	\$	\$
1912	1,456,434	235,119	1,691,555
1911		138,885	1,290,857
Increases	354,462	96,234	400,698

Shanghai Tramway Returns.—The returns of the Shanghai Tramways (Foreign Settlement) for the week ended August 14 are as under:—

	1912.	1911.
	\$	\$
Effective receipts (after		1
deducting loss by ex-		
change)	16,242.29	11,933.55
Passengers carried8	41,315	562,575
Car miles run	54,257	43,447

The loss by Exchange of subsidiary coinage for the week was equal to 24.09 per cent. of the gross cash collected on the cars as compared with 23.78 per cent. for the corresponding week last year.

The loss by exchange of subsidiary coinage for the week was equal to 24.45 per cent. of the gross cash collected on the cars as compared with 23.30 per cent. for the corresponding week last year.

ROADS AND BRIDGES

Developing Manila.—For the construction of Calle Dasmarinas, a street to replace or supplement the Escolta, Manila, as a business street, a sum of P200,000 has been set aside from the P736,000 loan secured from the Insular government. This is the street which is finally to replace, or supplement, the Escolta, as a business street. It lies parallel with the latter thoroughfare and about 200 meters to the eastward, one section of it already being of full city street width. The intention is finally to extend it to the Binondo canal on the west, and to Santa Cruz on the east, which will relieve the congestion on the Escolta, as well as affording on opportunity for the expansion of the retail district.

Another appropriation, this one of P50,000 will be utilized for widening, straightening and otherwise improving Calle Echague, from Plaza Goiti to the San Miguel bridge.

The loan of P736,000 has been obtained from the insular government by the city of Manila, for permanent improvements. The sum obtained is part of the gold reserve, and will draw interest at the rate of 3½ per cent per annum. The loan is for ten years, and will be used for bridges and permanent street improvements, although an additional loan may be required for the three bridges on Azcarraga, which will require a considerable sum.

There are ten projects in all upon which the loan will be spent, and may be identified as follows:

No. I. For the construction of a Central

School building, P100,000.

No. 2. For constructing and widening calle Dasmariñas from calle Rosario to calle Nueva, P200,000.

No. 3. For constructing and widening calle

Echague, P50,000.

No. 4. For the construction and extension of calle Ayala from calle Marques de Comillas to calle San Marcelino, P55.000.

No. 5. For the construction and extension of calle Tayuman from calle Cervantes to calle Anloague, P13,000.

No. 6, For the construction of Prim Bridge, Azcarraga Bridge and Orda Bridge, on calle

Azcarraga, P76.000.

No. 7. For the construction of streets, gutters and other improvements, in sanitary barrios, and for improving, draining and filling land belonging to the City of Manila, P100,000.

No. 8. Eor completing the construction of

Tondo Market, P17,000.

No. 9. For constructing and improving streets not otherwise specifically provided for by loans, including in all the expenditure of PIII,000.

Of project No. 9 the sum of P61,000 will be

spent as follows:

Treatment of asphalt pitch and tar of calle Echague, calle San Miguel, Calderon de la Barca, part of Anloague, and part of Plaza Goiti P22,000; Improvement of Taft Ave., North of calle Herran, P14,000; construction between San Andres and Vita Cruz, P6,000, and sundry minor projects of new street construction, P2,000.

For general widening, straightening and

opening of streets, P50,000.

No. 10. For the construction of 12 midden sheds and sanitary construction in the public market and midden sheds, P14,000.

At the close of the fiscal year, 1913, in all there will be 200 midden sheds scattered throughout the city. Total P736,000.

Projects Nos. 7, 9 and 10 are contemplated almost wholly for expenditure on the north

side.

Oil on Manila Roads .- The application of oil to the surface of the Las Piñas San Pedro-Tunasan section of the Manila South Road was completed about June 1. The oil was applied to 15.2 kilometers of road. For the purpose of comparing the maintenance costs of oiled and unoiled roads, 2 kilometers were not oiled. One of these kilometers is straight and the other kilometer has several curves, thus giving the result upon both straight and curved roads. Kilometers I and 2 of the Manila South Road have been resurfaced with an asphalt pavement. The pavement has a width of 5 meters. Kilometer 3 has been resurfaced and treated with an application of asphaltic oil, possessing a specific gravity of 0.07 Resurfacing is now under way on kilometer 4. Stone has been delivered at Malabon for resurfacing kilometers I and 2, and one-half of kilometer 3 of the Manila North Road.

The Pasay-McKinley Road has been completed from Fort McKinley to the Pasay Plaza. The length of completed road is about 5 kilometer. The surfacing is composed of 4 inches of broken stone laid upon a foundation of adobe stone averaging 10 inches in depth. The width of metalling is 4 meters. The U.S. Army furnished the transportation, both water and land, for this project. It is expected to have a new road connecting the Pasay Plaza with the Manila South Road completed by July 15.

Philippines Provincial Roads.—Special allotments made by the Secretary of Commerce and Police of the Philippine Islands, from funds provided under Act 2059, recently released by the Governor General, in the amount of P638,-800 which is to be allotted as follows for the fiscal year 1913:

Ambos Camarines.—For the reconstruction of the first class road between Nueva Caceres

at Iriga, P20,000.

This allotment conditioned on the securing of a loan by the province of P20,000 for one half the cost of the construction of a concrete bridge over the Argus River to the provincial boundary, the province of Albay to meet the other half of the cost.

Bulacan and Nueva Ecija.—For the construction of the Manila-North Boundary road from San Miguel, Bulacan, to Gapan, Nueva Ecija,

P100,000.

P5,000.

Iloilo:—For the construction of provincial road work within the limits of the city of Iloilo, P25,000.

This allotment conditional by the appropriation by the province and the City of Iloilo jointly, of an additional P25,000 for the work.

La-Laguna.—For the completion of the San Pablo-Tiaong Road, P15,000.

Pablo-Tiaong Koad, P15,000.

Pangasinan.—For the completion of the Villasis-Urdaneta-Binalonan Road, P25,000. For the maintenance of the road from Bobo-

nan, Pangasinan to the Benguet boundary line Pro,000.

Rizal.—For the maintenance of the Manila-North Road from Manila city limits to the Bulacan boundary line, P5,000.

For the maintenance of the Manila-South Road from Manila city limits to San Pedro Tunasan, P15,000.

Road Prizes.—For road prizes to be awarded on the recommendation of the road committee,

P30,000.
Foreman and Capataz Prizes.—To be awarded as above, P5,000.

Road Committee.—For the expenses of the road committee, fiscal year 1913, P5,000.

Bureau of Public Works.—For experimental road and bridge construction and maintenance work, by the bureau of public works including the use of asphalt, oil and other bituminous binders, P30,000.

Capiz.—Panilan-Pilar Road, P50,000.
Rizal.—Maintenance Pasay-McKinley Road,

Cavite.—Dasmarinas-Silang Road, P33,000.
Ilocos Norte.—Laoag Bridge, P50,000.

Hoilo.—Feeder roads, Pico,000.

Allotment not yet made. Secretary of Commerce and Police, awaiting final recommendation of the director of public works.

(Survey and estimate Dueñas-Lumbanao-Viejo

road not finished).
Balance for contingency, P5,800.

MINES AND MINERALS

Malay Tin.—During June 3,472 tons of tin were exported from the Federated Malay States, as compared with 3,775 tons for the corresponding month of last year.

The Moji Coal Trade.—The total shipment of coal from Moji during June last was 188,784 tons: an increase of 21,150 tons on the figures for the previous month. The quantity shipped to foreign ports alone was 81,204 tons, including 36,540 tons to Hongkong, 14,600 tons to Manila, 12,100 tons to Honolulu, 6,850 tons to Rangoon, 6,700 to Colombo, 3,400 tons to Batavia, and 1,014 tons to Shanghai. Coal forwarded to home ports was 41,517 tons, and that taken by foreign and Japanese vessels for their own use 45,655 tons and 20,408 tons, respectively.

Lungkoshan Silver Mines.—The area of the silver mine of Lungkoshan is about 100 square li. The Civil Governor has decided to send deputies to consult with the gentry as to the best plan to develop the mine so as to prevent local opposition based upon superstitious belief. The mine will be developed in co-operation with the people. They may invest their money in the enterprise and the mine owners may take proportionate shares. The method of development is semi-modern, as funds are not enough to start the work in full swing.

Output of Indian Mines.—During June the output of the Indian gold mines was 47,969 oz., showing a decrease of 722 oz., as compared with the preceding month and an increase of 935 oz., as compared with the corresponding period of 1911. The production since the beginning of 1908 has been as follows:—

1910.

1912.

1911.

Jan	45,598	47,031	46,548	47,163	47,988
Feb	44,214	41,898	45,464	45,448	46,731
Mar	45,582	46,079	47,035	47'126	47,981
Apr	•••45.352	46,128	46,842	46,981	48,259
May	45,368	46,514	46,815	47,202	48,601
June	45,687	46,475	46,754	47,034	47,969
July	45,862	46,700	47,006	47,591	-
Aug	45,586	47,038	46,934	47,730	
Sept	45,155	47,274	47,958	47,992	
Oct	47,360	47,254	47,220	47,076	
Nov	47.716	47,179	47,272	49,100	***********
Dec	52,409	54.318	48,419	52,186	
Total	-555,889	563,888	564,276	573,529	287,619

W. McWhae and R. Y. Hanlon who returned from Hongkong, recently predicted that the dredge of the Philippines Bucket Dredge Company, Ltd. would be installed within the next three months on the company's ground on the Paracale River. The first shipment comprised twenty-five tons of machine shop equipment and other consignments are expected from time to time in Manila and will be forwarded promptly to the ground. The second dredge ordered by the company in Australia will arrive in Paracale about the first of September.

New Burma Company.—When last mail left Mandalay the prospectus was out for a new lead company to be called "The Oriental Mining Company, Ltd." The capital was fixed at Rupees 2,000,000, and the object is to

acquire by purchase from the vendor, Mr. C. Soon Thin, of Mandalay, the Mining and Prospecting Leases which have been granted to him by the Government in the Wuntho Sub-division of the Katha District and which are known as Mawkhwin and Mawkhar Lead mines, each covering an area of two miles by one mile or containing in all 1880 acres each.

It is proposed to erect two smelters and furnaces capable of discharging 10 tons each in 24 hours at sites convenient to the mines in order to avoid unnecessary transport charges. Assays yielded 60 per cent. of lead, 33 oz. 15 dwt., 4 grains of silver per ton of lead.

Chinese Engineering and Mining Co.-The "Mining Journal" (London) learns that "the issue of £1,200,000 six per cent. first mortgage debentures just made by the Chinese Engineering & Mining Company, Limited, has been fully subscribed, and that the underwriters have been entirely relieved. This result is explained by the character of the enterprise as demonstrated by the dividend record of the old company, the powerful international interests concerned in it, and the fact that all difficulties in China have been removed by the arrangements effected through the British and Chinese Governments. The concern is one which appears certain to increase in importance with the industrial development of China."

The New Franco-Japanese Bank.—Financial circles have been greatly interested in the establishment of the Franco-Japanese Bank, negotiations for which have been proceeding for some time. The first inauguration meeting was held on June 24, and on July 3 the second inauguration meeting was held, when the establishment of the Bank was complete. The capital of the Bank is 25,000,000 francs or about 10,000,000 yen, of which 6,000,000 yen will be raised from French capitalists and the rest from Japanese. Of the 20,000 shares (yen 4,000,000) to be taken up in Japan 12,000 shares will be subscribed for by the Japan Industrial Bank, 2,500 each by the Daiichi, Mitsui and Mitsu-Bishi Banks, and 100 shares each by Bank, 2,500 each by the Daiichi, Mitsui and Mitsu-Bishi Banks, and 100 shares each by Viscount Mishima, Mr. Konojo Tatsumi and three others who will be the directors of the new bank. The Daiichi, Mitsui and the Japan Industrial Banks will accept the shares in the name of the banks, but it is not certain whether the Mitsu-Bishi Bank will do the same or not.

The President of the new Bank will be Mr. Guelnot who has long years' experience both as a Government and a private financier, and Dr. Soyeda, President of the Industrial Bank of Japan will be the Vice-President.

As to the appointment of the board of directors from the Japanese side, it was decided that beside Dr. Soyeda, who will be the Vice-President, and a French director to reside in apan, two directors will be nominated by Dr. Soyeda from among the directors of the Japan Industrial Bank, and another candidate, not in any way connected with the associate banks. will be nominated by Marquis Inouve, and Financial Minister Yamamoto and will be the managing director. The representatives of the associate banks will have a voice in the management of the banking business as advisers, Viscount Mishima, Baron Shibusawa, and Mr. Hayakawa having consented to be such advisers. Baron Iwasaki will be the adviser in name, for the Mitsu-Bishi Bank, but Mr. Mimura will be present in all the deliberations. Marquis Inouve and Financial Minister Yamamoto are said to have in view for Managing-Director a man who is now a member of the Imperial Diet and who had once been a director of a Colliery Company.

As to the principle of the business of the new bank, it was first intended that investment on a large scale in all enterprises in the Far East in general should be undertaken. Though this principle has never been abandoned, an important objection has been raised to this point as that nothing definite had been arrived at for a long time. As the result of this objection, it was agreed upon that the objects

of the Six-Power Loan to China may not be encroached upon, and that the activity of the bank in China will be slow but steady so that there may be a wholesome progress of the work of the bank. Therefore, the work to be undertaken by the new bank will be nothing but a general banking business, the undertaking of the issue of debentures, and other similar work. The bank will open its business as soon as the appointment of the board of directors and the registration of the Japan branch office is finished.

In France, the best site near the Bourse has been selected for the institution and the appointment of the Manager and Vice-Manager and all the employees have been made. The business will be opened as soon as the building of the bank will be finished. Viewed from the French standpoint, the establishment of the bank can now be said to be complete. In Japan, the preparations for opening the business are being pushed on steadily. The relation between the Japan Industrial Bank and Baron Guntsburg has come to an end by the establishment of the Franco-Japanese Bank, and the Japan Industrial Bank will be hereafter represented in France by the Franco-Japanese Bank. The stockholders of the Franco-Japanese Bank includes, besides la Société Générale, Banque de Paris and Juichi Soyeda who acted as the promoters, all the notable banks in France, England and Russia.

Kwangtung Loans and Finance.—A domestic loan of \$10,000,000 which is to be raised by the Kwangtung Government will be used only for internal improvements and productive industrial enterprises. Governor-General Wu Han Man declared that the Government will lend millions for productive enterprises but not a cent for administrative purpose. Commissioner of Civil Affairs Chien Shih Fan will spend a part of the loan for the construction of a tramway in Canton, to improve Ta-Sha-Tao, a small island in front of Canton, and to build markets within Canton city.

The \$5,000,000 the Hongkong and Canton merchants are raising to form an association to back up the Kwangtung Government notes will become the base for the ten million dollar bank to be organized to act as the treasury of the government.

Luk Yau, a well-known capitalist of Singapore, will organize at Canton a private bank with \$10,000,000 capital also. He expects to raise most of the capital from merchants abroad.

The Chung Kuo Bank .- In Peking this bank (formerly the Ta Ching Government Bank) has begun business transactions, and has issued banknotes of three denominations, \$1, \$5 and \$10, for circulation in the capital.

Russo-Mongolian Bank.—It has been decided that a Russo-Mongolian bank, to be named the Romo Ginko, shall be set up in Kulon to assist in the development of Mongolian trade and commerce. Russian financiers will provide the money and discharge all banking duties needed for the purposes of this new enterprise. In Tokyo it is evidently considered that this undertaking will occupy in history a place similar to that held by the Russo-Chinese Bank a few years ago.

Hongkong and Shanghai Bank .-- The Directors on August 17, submitted a General Statement of the affairs of the Bank, and Balance Sheet for the half-year ending 30th June, 1912. The net profits for that period, including \$1,953,135.15, balance brought forward from last account, after paying all charges, deducting interest paid and due, and making provision for bad and doubtfui accounts, amount to \$4,869,054.88. The Directors recommend the transfer of \$250,000 from the Profit and Loss Account to credit of the Silver Reserve Fund, which Fund will then stand at \$17,000,000. They also recommend writing off Bank Premises Amount the sum of \$250,000.

After making these Transfers and deducting Remuneration to Directors there remains for appropriation \$4,354,054.88, out of which the Directors recommend the payment of a Dividend of Two Pounds Sterling per Share, viz., £240,000, which at 2/018, the rate of the day, will absorb \$2,393,766.24, the Balance \$1,960,288.64 to be carried to New Profit and Loss Account. The holding of \$1,200,000 2½% Consols has been written down by £24,000 to £900,000, and now stands in the Books at 75; "Other Sterling Securities" have also been written down to the extent of about £9,500. To effect these adjustments and maintain the Fund at £1,500,000, British and Indian Government guaranteed stocks to the face value of £41,500, costing £33,569, 1s. 3d., were purchased and added to "Other Sterling Securities" bringing the amount under that heading to £406,500 written down to £335,400. This expenditure was met out of the earnings of the half-year.



HELD IN STOCK FOR SALE BY

AUSTRALIA Thos. McPherson & Son John Danks&Son Prop. Ltd AUCKLAND. -Wm. Adams & Co., Ltd Chas. Atkins & Co., Ltd. ADELAIDE. Leslie & Co. J. Blackwood&Son, Ltd - - Wm. Adams & Co., Ltd A. J. Lawrence & Co. NEWCASTLE, N.S.W., Paul & Gray.Ltd

Brisbane, - Wm. Adams & Co., Ltd.

NEW ZEALAND A. & T. Burt, Ltd DUNEDIN, - -Wellington. Empire Oil Co., Ltd.
ChristChurch, MasonStruthers&Co.Ltd Colombo, Walker, Sons & Co., Ltd. TASMANIA HOBART, - - Charles Davis, Ltd. LAUNCESTON, Salisbury's Fdy Co. Ltd

CHINA SHANGHAI, Dodwell & Co., Ltd. Hong Kong, The United Asbestos Oriental Agency, Ltd.

INDIA CALCUTTA, John King & Co., Ltd. BOMBAY, Thompson & Gidley STRAITS SETTLEMENTS Central Engine Works MANILA, P. I. Pacific Commercial Co. JAPAN

YOKOHAMA, . . F. W. Horne

ALPHABETICAL LIST OF ADVERTISERS

Alhambra Cigar & Cigarette Factory 56 American Car & Foundry Co. 12 American Bank Note Co. 44 American Blower Co. 46 American Locomotive Co. 13 American Tool Works. 37 American Trading Co. 47 Anderson & Co., Wm. H. 48 Arnhold, Karberg & Co. 27 Asbestos & Rubberworks Alfred Calmon, Ltd. 70	Fairbanks-Morse & Co. Fiat-san Giorgio Ltd. F. L. H. General Electric Co. Germinal Cigar & Cigarette Factory Goulds Manufacturing Co. Green Island Cement Co., Ltd. Green, Tweed & Co. Greilsammer Bros.	29 9 72 35, 74 56 3 49	Lanchow Mining Co. Ltd. Leeds Forge Co., Ltd., The Leiman Bros. Lima Locomotive Works. Lodge & Shipley Machine Tool Co. Manila Railroad Co. Melchers & Co. Middleton & Co., Ltd. Mitsu Bishi Dockyard & Eng. Works. Mitsui Bussan Kaisha. Morse & Son, A. J. Municipal Engineering & Contracting Co.	34 67 19 3 24, 25 28 39 2 53 69	Shanghai Dock & Eng. Co., Ltd., The 7 Shanghai Gas Co., Ltd. 52 Shanghai Machine Co. 52 Shanghai-Nanking Ry. 14 Shewan, Tomes & Co. 30 Siemens China Electrical Engineering Co. 33 Southern Pacific Co. 63 South Manchuria Railway Co., Mining Dept. 55 South Manchuria Railway Co. 16 Smith's Dock Co., Ltd. 5 Standard Oil Co. of New York 46, 60 Stevenson & Co., Ltd., W. F. 76 Strong, Frank L. 47, 66
Baldwin Locomotive Works	Hannoversche Maschinenbau A. G., Vormals Georg Egestorff Henschel & Sohn Herbert S. Walker Herbrand & Co., P. Hongkong & Shanghai Banking Corporation.	23 23 71 26 Cover	Norton, Harrison & Co	76 Cover 75	Taikoo Dockyard and Engineering Company of Hongkong, Ltd. 4 Toyo Kisen Kaisha 45 Trussed Concrete Steel Co. 42 Tsingtauer Werft. 5 Tyer & Co., Ltd. 36, 71
Chee Hsin Cement Co., Ltd	Hongkong & Whampoa Dock Co., Ltd Honolulu Iron Works Co. Hotels Hupeh Cement Co.	2 38 69 50	Pacific Tank and Pipe Co. Philippine Journal of Science. The Port Banga Lumber Co. Pratt's Priestman Brothers, Ltd.	76 72 70 Cover 39	United States Steel Products Co. 11, 15, 37, 43, 68, 71 Vander Loo & Co., F. A
Chosen (Korean) Railway	International Banking Corp International Steam Pump Co International Correspondence Schools Jardine, Matheson & Co Johnson-Pickett Rope Co	73 40	Racine, Ackermann & Co		Vulcan Iron Works. 9 Western Electric Co. 39 White & Co. (Inc.) J. G. 29 William Cramp & Sons 6
Cyklon-Maschinenfabrik, m. b. H. Ber- lin	Keystone Driller Co	67 6	Samuel & Co., Ltd,		Yale & Towne Mfg. Co. 67 Ynchausti & Co. 64 Young, C. G. 69

Classified Advertisers' Directory

(Please mention this journal)

Adding Machines Greilsammer Bros.

Agricultural Implements

Anderson & Co., W. H. Alcohol Distillers

Cia. General de Tabacos de Filipinas. Ynchausti & Co.

Banks

Deutsch-Asiatische Hongkong and Shanghai Banking Corp. International Banking Corp. Banco Español Filipino Russo-Asiatic Bank

Boilers Babcock & Wilcox Ltd.

Shanghai Dock & Engineering Co., Ltd. Boilers (Patent Water Tube Steam)

General Electric Co. Jardine Matheson & Co. Bridge-Builders

White & Co., Inc., J. G. Shanghai Dock & Engineering Co., Ltd. **Building Materials**

Malthoid Paraffine Paint Co. W. H. Anderson & Co. Cables, Telephone, Telegraph Sup-

plies Beilis & Morcom, Ltd. W. T. Henley's Telegraph Works Co., Ltd.

Melchers & Co. Car-Builders

American Car & Foundry Co.

Cement

Anderson & Co., W. H. British American Tobacco Co. Chee Hsin Cement Co., Ltd. Chinese Engineering and Mining Co., Ltd. Green Island Cement Co., Ltd. Racine, Ackermann & Co.

Chimneys Babcock & Wilcox Ltd.

Cigar and Cigarette Manufacturers Alhambra Cigar & Cigarette Factory. Cia. Gral. de Tabacos de Filipinas

Germinal Cigar Factory Olsen & Co., Walter E.

Civil Engineers C. G. Young

Coal Dealers

Chinese Engineering and Mining Co., Ltd. The Lanchow Mining Co., Ltd. The Mitsui Bussan Kaisha South Manchuria Railway Co.

Coal Handling Machinery Babcock & Wilcox Ltd.

Coffee Dealers (Wholesale) M. A. Clarke (Mayon)

Contractors, (General)

Bohler Bros. & Co. Frank L. Strong Shanghai Dock & Engineering Co. Ltd. White & Co. Inc., J. G. Samuel & Co., Ltd.

Contractors, Electrical Shanghai Dock & Engineering Co. Ltd. Arnhold, Karberg & Co. Shewan Tomes & Co. Frank L. Strong

Siemens China Electric Engineering Co. Consulting Engineers White & Co., Inc. J. G. C. G. Young

Cranes

Babcock & Wilcox Ltd.

Conveyors Babcock & Wilcox Ltd.

Diving Apparatus

A. J. Morse & Son

Dredgers

Middleton & Co., Ltd. Melchers & Co. Priestman Bros. Ltd. Rose, Downs & Thompson, Ltd. Shanghai Dock & Engineering Co., Ltd.

Drilling Machines The Keystone's Driller Co.

Dry Goods, Wholesale The H. B. Claffin Co.

Drying System American Blower Co.

Economizers

Babcock & Wilcox Ltd.

Electric Lighting Plants Anderson Meyer & Co. Arnhold, Karberg & Co. Fearon, Daniel & Co. General Electric Co. Siemens China Electric Eng. Co. Shanghai Machine Co. Shanghai Dock & Engineering Co., Ltd. Shewan, Tomes & Co. U. S. Steel Products Co. Western Electric Co.

Electrical Supplies

American Trading Co. Anderson, Meyer & Co. Arnhold, Karberg & Co. Jardine, Matheson & Co. Babcock & Wilcox (D. W. Bell) Bellis & Morcom (D. W. Bell) Fearon, Daniel & Co. General Electric Co. Melchers & Co. Shewan, Tomes & Co. Siemens China Electric Eng. Co. Shanghai Machine Co. Shanghai Dock & Engineering Co., Ltd. U. S. Steel Products Co. Western Electric Co.

Engines (Pumping) Bellis & Morcom (D. W. Bell) Shanghai Dock & Engineering Co., Ltd.

Excavators and Elevator Priestman Bros. Ltd. Rose, Downs & Thompson, Ltd. Shanghai Dock & Engineering Co., Ltd.

Explosives Jardine, Matheson & Co. Arnhold, Karberg & Co. Rendrock Powder Co.

Feed Water Heaters Babcock & Wilcox Ltd.

Food Products Anderson & Co., W. H.

Gas Engines Shanghai Gas Co., Ltd. Melchers & Co.

Campbell Gas Engine Co., Ltd., The Hotels Astor House Hotel Co. Salween House & Tenasserim House

Ice Machinery Vulcan Iron Works Melchers & Co.

Insurance Stevenson & Co., Ltd., W. F. Journals, Science

The Philippine Journal of Science Herbert S. Walker Life Insurance

China Mutual Life Insurance Co., Ltd. Locks Yale & Towne Mfg. Co.

Lithographers Commercial Press, Ltd.

Lubricants

Albany Lubricating Co. Lumber Dealers

Robert Dollar Co. China Import Export Jardine, Matheson & Co. Port Banga Lumber Co.

Machinery Merchants Anderson, Meyer & Co. Arnhold, Karberg & Co.

Shanghai Machine Co. Fearon, Daniel & Co. Frank L. Strong Schuchardt & Schutte. Shanghai Dock & Engineering Co., Ltd. Samuel & Co., Ltd. Tulloch & Co.

Mill Machinery Rose Downs & Thompson Ltd. Shanghai Dock & Engineering Co., Ltd.

Mining Machinery American Trading Co. Melchers & Co. Shanghai Machine Co. Shanghai Dock & Engineering Co., Ltd. Shewan, Tomes & Co.

Mining Companies Chinese Engineering & Mining Co. South Manchuria Railway Co. Mitsui Bussan Kaisha

Motors Shanghai Dock & Engineering Co., Ltd. Pratt's

Motor Launches Shanghai Dock & Engineering Co., Ltd. Paints Oils and Varnish

Standard Oil Albany Lubricating Co. F. A. Vander Loo & Co.

Packing Greene Tweed & Co.

Pulleys (Steel)

Schuchardt & Schütte Shanghai Machine Co.

Shewan, Tomes & Co.

Jardine, Matheson & Co.

Shanghai Dock & Engineering Co., Ltd. Pumps The Goulds Manufacturing Co.

Shanghai Machine Co.

Shanghai Dock & Engineering Co., Ltd. Railroads Chinese Government Railways Manila Railroad Co. South Manchuria

International Steam Pump Co.

Samuel & Co., Ltd.

Tulloch & Co.

Southern Pacific Co. Railroad Supplies American Trading Co. American Locomotive Co. Anderson, Meyer & Co. Arnhold, Karberg & Co. Baldwin Locomotive Work. Fearon, Daniel & Co.

Hannoversche Maschinenbau A. G. Vormals Georg Egestorff. Henschel & Sohn. P. Herbrand & Co. Jardine, Matheson & Co., Ltd. Melchers & Co. Mitsui Bussan Kaisha Shewan, Tomes & Co. Shanghai Machine Co. Shanghai Dock & Engineering Co., Ltd. Tyer & Co. U. S. Steel Products Co. Rallway Signal Co., Ltd., The Robert Dollar Co.

Reinforced Concrete Construction Shanghai Dock & Engineering Co., Ltd.

U. S. Steel Products Co. Roofing Paper California Manila Lumber Commercial Co.

Asbestos & Rubberworks Alfred Calmon, Ltd.

Robe Manufacturers Johnson-Pickett Rope Co.

Trussed Concrete Steel Co.

U. S. Steel Products Co. Ynchausti & Co. Saw Mills

Jardine, Matheson & Co. Port Banga Lumber Co. School

Harvard Medical School Ship-Chandlery

Ynchausti & Co. Shipping Agents Cia. General de Tabacos Shewan, Tomes & Co.

Stevenson & Co., Ltd. Shipbuilding and Repairs

Fiat-san Giorgio Ltd. Tsingtauer Werft Hongkong & Whampoa Dock Co., Ltd. Kiangnan Dock and Engineering Co., Ltd. Mitsu Bishi Dock and Engineering Works Shanghai Dock and Engineering Co., Ltd. Smith's Dock Co., Ltd. The Taikoo Dockyard and Engineering Com-

pany of Hongkong, Limited William Cramp & Sons. Steamship Companies

Cia. General de Tabacos Pacific Mail S. S. Co.

Ynchausti & Co. Steel Manufacturers

United States Steel Products Export Co. Steel Works

Bohler Bros. & Co., Ltd. U. S. Steel Products Co.

Stokers Babcock & Wilcox Ltd.

Structural Steel

Bohler Bros. & Co.

Shanghai Dock & Engineering Co., Ltd. U. S. Steel Products Co.

Sugar Machinery Honolulu Iron Works. Superheaters

Babcock & Wilcox Ltd.

Tanks Pacific Tank and Pipe Co.

Shanghai Dock & Engineering Co., Ltd. U. S. Steel Products Co. Telephones

The Western Electric Co.

Tiles and Bricks Green Island Cement Co., Ltd. Chinese Eng. Mining Co.

Tobacco Dealers British-American Tobacco Co., Ltd.

Cia. General de Tabacos Olsen & Co., Walter E.

Tools American Tool Works Co. Lodge & Shipley Machine Tool Co. Shanghai Machine Co.

Easterbrook Allcard & Co., Ltd. The Selson Engineering Co., Ltd. Shanghai Dock & Engineering Co., Ltd.

Windmills Deflance Machine Works.

Water Softeners Babcock & Wilcox Ltd.

Wood Working Machinery American Tool Works Co. Defiance Machine Works.

Lodge & Shipley Machine Tool Co. Shanghai Dock & Engineering Co., Ltd.